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Journal of the Society of Arts.

FRIDAY, JUNE 5, 1863.

WOOD CARVING.

The Exhibition of specimens sent in competition for the prizes offered by the Society of Arts and the Society of Wood-Carvers, as well as other specimens of wood-carving, will be open to members and their friends on Tuesday next, the 9th June.

CONVERSAZIONE.

The Council have arranged for a Conversazione at the South Kensington Museum, on Friday evening, the 12th June, for which cards have been issued.

ANNUAL DINNER.

The One Hundred-and-Ninth Anniversary Dinner of the members and their friends will take place at St. James's Hall, Piccadilly, on Saturday, the 20th inst., at Six o'clock punctually. The Solicitor-General, Sir Roundell Palmer, M.P., will preside.

Applications for tickets (price One Guinea each) should be made to the Financial Officer, at the Society's House, on and after Thursday, the 11th inst. Members desiring to have seats reserved for themselves and their friends, must take their tickets not later than Wednesday, the 17th inst.

CENTRAL COMMITTEE OF EDUCATIONAL UNIONS.

A meeting of the Central Committee will be held on Thursday, the 11th inst., at two o'clock.

TWELFTH ANNUAL CONFERENCE.—NOTICE TO INSTITUTIONS AND LOCAL BOARDS.

The Twelfth Annual Conference of the Representatives of the Institutions in Union and the Local Educational Boards with the Council will be held on Friday, the 12th June, at Twelve o'clock, noon. Sir THOMAS PHILLIPS, F.G.S., Chairman of the Council, will preside.

Secretaries of Institutions in Union are requested to forward, as soon as possible, to the Secretary of the Society of Arts, the names of the Representatives appointed to attend the Conference. The Chairmen or other Representatives of the Local Boards of Examiners are invited to attend the Conference.

The Council will lay before the Conference the Secretary's Report of the Proceedings of the Union for the past year, and the Results of the Examinations of the Central Committee of Educational Unions. The time for holding the Society's Examinations next year will also be considered.

The following subjects are suggested for discussion:—

1. Whether in the Elementary Examinations, in addition to the uniformity already, to a great extent, secured by the supply of the same papers of questions to the various Local Boards, further uniformity may not be obtained by a plan for aiding the Local Examiners in the estimation of the Candidates' answers?

2. Whether it is desirable to dispense with the "Previous Examinations" in *special* subjects?

3. The propriety of the Society of Arts employing an Organising Agent to visit the various Institutions.

4. How far is it desirable and practicable to combine the objects of the Working Men's Clubs—viz., amusements, draughts, chess, refreshment, &c., with the educational objects of Mechanics' Institutes, and whether the members of Institutes can be retained during the summer, by providing healthful recreation and studies requiring illustration from nature?

5. The propriety of holding one or more meetings of Representatives of Institutes about the time of the Annual Conference at the Society of Arts, for the purpose of reading short papers or essays on various subjects of interest.

6. The expediency and means of establishing competitive exhibitions of the Works of Art Workmen and Skilled Artisans.

7. Whether it would be expedient that Apprentices should be examined, at the conclusion of their term, in the principles and practice of their craft or business, and Certificates granted to them?

8. Whether it would not be desirable for Institutions to give Testimonials to their members, and to keep registers of those so recommended by other Institutions?

9. The expediency of holding local competitions in Shorthand.

Notice of any other subjects which Representatives may desire to introduce to the notice of the Conference should be given to the Secretary of the Society of Arts, to whom should also be forwarded a copy of the last Annual Report of each Institution.

Representatives of Institutions and Local Boards attending the Conference are invited to the Society's Conversazione, at the South Kensington Museum, in the evening of the same day (12th June), and will receive cards on application at the Society's House on the day of the Conference.

THE SOCIETY'S MEMORIAL OF THE PRINCE CONSORT.

The following additional names have been received up to the 3rd inst.:—

Bradley, John.....	£1	1	0
Cammell, Charles	1	1	0
Heath, Robert.....	1	1	0
Hutchinson, John	1	1	0
Willis, James.....	1	1	0

COMMITTEES OF REFERENCE. ECONOMIC AND SANITARY SCIENCE.

The Committee met on Friday afternoon, 29th ult., Thomas King Chambers, Esq., M.D., in the chair.

The **SECRETARY** (in the absence of the Chairman of the Council) having explained the views of the Council with regard to these committees,

Mr. **MICHAEL** said there was one subject of importance from which considerable benefit might accrue to the country by such an organisation as this committee could initiate, namely, facilitating sanitary operations in town and country. After pointing out the difficulties experienced by Local Boards of Health, in the opposition of owners of private property, lodging houses, &c., he suggested that it would be desirable to ascertain, by conference or correspondence with Local Boards of Health, what amendments in the Local Management Act would enable bodies entrusted with the guardianship of the public health to carry out more satisfactorily the provisions of the Act.

Dr. **CAPLIN** said he had been a member of a sanitary committee in Manchester, and had not met with the difficulties alluded to by the preceding speaker. As far as his own experience went, he believed that compulsory legislation would not meet the evil complained of, and that sanitary improvements must be looked for from moral persuasion alone.

Dr. **WALLER LEWIS** thought the subject introduced by the first speaker was one which might be properly taken up by this Committee. They all knew that in carrying out drainage, and the application of sanitary measures to large or small towns, the first object was to get rid of the sewage matters. The great difficulty which met them at the present time was the ultimate disposition of the aggregate sewage, which had unfortunately created an evil almost as great as not draining at all, viz., that the great mass of the sewage was directed into the nearest river or stream, occasioning constant complaints from all parts of the country. In the case of the town of Croydon there had been almost incessant litigation on this subject between the Board of Health and the persons owning the stream into which the sewage matters were discharged. Action after action had been tried, and large damages had been given against the Local Board of Health on account of the destruction of fish through the pollution of the river. Water which formerly was potable was no longer fit to be drunk, and there had been loud complaints on the subject. It was an admitted difficulty, because they had not the means of deodorising and getting rid of the fecal and ammoniacal matters contained in the sewage. Although they might precipitate the solid matter and strain the liquid and pass it out colourless, and apparently inodorous and tasteless, yet when it was discharged into a stream that was stagnant in part of its course, there was so much nitrogenous matter left in it, that although the stream did not become thick and turbid, it was nevertheless polluted. If by the aid of chemistry combined with mechanics they could get rid of this evil, one obstacle would be removed which now prevented many towns from coming under the operation of the Local Health Acts.

Mr. **ROBERT RAWLINSON** had listened with much interest to the remarks of Mr. Michael. As one who had been engaged in carrying out the Local Government Acts, and as a member of the Royal Commission for inquiring into the subject adverted to by Dr. Waller Lewis, he (Mr. Rawlinson) did not wish to say that this committee could not do good service by taking the question up, but he thought he was in possession of information which carried the question further than any which those gentlemen could have the means of being acquainted with. The Local Government Act, as they were aware, was a permissive act, and was in force in 400 or 500 towns. From time to time, as

difficulties had arisen, amendments had been made in that act, and with respect to the cases alluded to by Mr. Michael, he had accompanied a deputation to the government that day with the view of enabling local boards to carry out private improvements, to apportion the expenses of the same upon the owners of the property, and to receive the money from them when the works were executed and the appointment was made. With regard to the sewage of towns and the ultimate disposal of it at the outlet, experiments were now being made at Rugby, in the application of the liquid sewage to the grass land in that neighbourhood. A parliamentary committee was appointed last session to take evidence upon that question, and various opinions were given. There was an opinion on the part of many persons that the excretal matter of large towns was of enormous commercial value. That opinion was held by able men, who gave chapter and verse for all they advanced; but he thought, in coming to this sanguine conclusion, they did not take one great element in the question into calculation. He would briefly refer to some of the elements they had to deal with in grappling with the sewage of large towns at the outlet. Whatever fertilising value might be put by the chemist upon the sewage itself, they must deduct an enormous per centage from it when they came to use it, for this reason—the flow of the sewage was constant and unceasing; then, as to the idea of tanking it, he could only use one word, that was, it was monstrous. Any money expended upon tanks was an absurd waste of the capital of the ratepayers, because it established a monster nuisance, which they had not the means of getting rid of; whatever they did with the sewage, they must get rid of it at once; whether it was deposited upon the land, or the solids were thrown down, they must do it promptly, and without tanks. Take the case of London. The water supply amounted on the average to a hundred millions of gallons in the 24 hours; add to that the subsoil water, which, when the low level sewer now in progress was completed, would be greatly increased, and would amount to double the daily water supply. Look at the size of tank to hold the 100,000,000 gallons of water only, and then take that quantity for a week; because if they were to have tanks they must retain the water for some period of time. Then add to that the subsoil water and surface water from rain-falls, and they had a state of things that no human means could grapple with. They might do something with the sewage otherwise than tanking. There was no doubt in his own mind that the sewage of a populous town might be concentrated upon a comparatively small area of land. The sewage of Carlisle, with a population of 33,000, had been for several years successfully manipulated over 90 acres of land. At Croydon, he was happy to say, the authorities had got over the difficulties adverted to by Dr. Waller Lewis. An area of 800 acres had been secured, but only one-third of that area had yet been operated upon, over which the sewage was distributed, and the result was that the land so treated had been sublet at an increased rental of £1 per acre; but if they calculated the value of the sewage at the rate some persons put upon it, they would experience great disappointment, and such exaggerated values, instead of forwarding the question, only threw it back. Then again, if they took land to turn the sewage upon, they must have some means of qualifying the nuisance, when the supply of the sewage overpowered the means of distribution, by rendering it innocuous. That could be done by having open canals in which they could treat the moving sewage with lime, and diminish the velocity of the flow of it to about three inches per second. The lime would have the effect of precipitating the solid and flocculent matters, and the water might be passed into the stream without creating a nuisance or killing fish, but the water from that stream would not be such as he would supply for drinking purposes. With regard to the supply of water to the West-end of London, it was pumped from above Teddington lock, but the drainage of a popu-

lation of upwards of a million was discharged into the Thames above Teddington lock. The drainage of Windsor, Reading, and other towns polluted the water there. That question would probably be taken up some day, and the necessity of supplying the public with water free from the these pollutions, upon the Roman and eastern plan of aqueducts, would, he believed, be recognised. It would not deprive the river of water to a greater extent than was the case now, whilst the water would be supplied to the metropolis in a condition fit for human beings to drink. That was nothing more than the water companies might fairly be asked to do, and he was quite sure that the public would be willing to secure so great a desideratum by paying a reasonable percentage upon the expenditure incurred for that purpose. If the committee succeeded in ventilating this question they would not have met in vain.

Mr. HENRY WHITFIELD said, having for thirty years taken great interest in sanitary matters and in the prevention as well as the cure of diseases, the results of his practical experience in that direction might not be without interest to the Committee. It had been a great object with him, as a medical man, in his own town of Ashford, to prevent the spread of infectious diseases by the speedy removal of persons affected from contact with the healthy. He had for many years endeavoured to get the local boards and parish authorities to take action in providing cottages to which patients might be removed upon the first breaking out of any contagious disease, such as small-pox or scarlatina. A communication on the subject had been made from his own parish to the Poor-Law Board, but although they were greatly disposed to favour such a plan, they had no power to act with regard to it. He had therefore taken up the matter personally, and had built and fitted up a small sanatorium at a little distance from Ashford, at a cost of £350. It was not originally intended for the use of the Union authorities, who to some extent were provided with the means of removing infected patients from the other inmates of the Union house, but he thought it highly important that each Union should be provided with two or three detached cottages at some distance from the general population of the parish, to which cases on the first break-out of any epidemic disorder could be speedily removed. Mr. Whitfield mentioned several instances in which he said he believed the spread of diseases had been prevented by this system of speedy removal of the first patient from contact with the rest of the household. He added that, at the present time, there were upwards of 50 subscribers to his private sanatorium from which he derived a small per centage for his outlay. He felt sure it was the best, if not the only means of saving the population of a district from the spread of that fearful disease small-pox, which was now so prevalent in the metropolis. He thought it would be desirable to press upon the Poor Law Board the necessity of enforcing the provision of detached cottages for these purposes in every Union. The expense would be small, as he believed such cottages might be built for £100 each, with proper sanitary requirements. He was happy to find that his suggestion had been adopted in several Unions.

The Rev. W. ACWORTH, as a guardian of long standing, thought there could be no question as to the great desirability of the plan brought forward by the last speaker. The guardians of Leicester had provided a sanatorium of the character described, which, though not far from the workhouse, was sufficiently removed to prevent the spread of contagion from contact, and the same kind of provision had been made in several of the industrial and pauper schools of the metropolis, to which the first cases of the outbreak of any contagious disorder were immediately removed. He entirely concurred in the remarks that had fallen with regard to sanitary measures in connection with the water supply of towns. As far back as twelve years ago, he was struck with the extent of remittent fever that prevailed in his own district of Plumstead, and having made extensive inquiries into the matter, a bill was intro-

duced into Parliament, by Lord Cranworth and Lord Palmerston, then Secretary of State for the Home Department, for the drainage of the whole of the marsh lands from the Nore up to London; but the progress of that measure was stopped by the introduction of the Local Management Act, which, it was stated by Lord Llanover, would entirely remove the evil complained of throughout the whole district of the bed of the Thames. The evidence of the most eminent medical men of the day, including the President of the College of Physicians, was given to show that in its then condition the valley of the Thames from Oxford down to the Nore was more or less subject to remittent fever and ague. A deputation upon the subject waited upon Sir George Grey last year, but unless the public mind were aroused, he feared nothing would be done to remedy this state of things. The Metropolitan Act did not extend to the parishes east of Plumstead, and the inhabitants of his parish were alarmed at the prospect of the introduction of so large a nuisance, from which it was apprehended that no one would be able to live there. There were other sanitary matters which it might be within the province of this Committee to touch upon, one of which was the habits of life of the lower classes, particularly the neglect of the principles of ventilation in their dwellings, and indulgence in alcoholic drinks, which interfered with the sanitary state of the people. It would be a desirable thing to make them understand the value of pure air and good water, even in such a parish as his own, with a population of 25,000. He should be happy to place at the disposal of the Committee a considerable amount of statistical information which he had gathered upon these matters during the last ten years, which was in itself sufficient to show the necessity for some steps being taken in this direction.

Mr. Alderman TOWLE said mention having been made of the city of Oxford, he would remark that if attention were directed to the state of things which was allowed to exist there, it might be of great benefit. It was astonishing the extent to which the waters of the Thames in that locality were permitted to be polluted by the discharge of the sewage of the town into them, in the face of the numerous plans that had been suggested for the remedy of that crying evil. The principal outlet of the sewage of Oxford had been carried to the corner of the Christchurch meadows, which was the scene of the fêtes and festivals of the city; and in seasons of drought and a diminished volume of water in the river, the accumulated mass of stagnant filth at that point was such as to occasion a fearful nuisance; and the only surprise was that in the present age of sanitary improvement such a state of things should be tolerated, more especially in the locality of one of the great Universities of the kingdom. In his own experience the application of the sewage to the land had produced the most remarkable results upon the crops, which he could show against all the country. He thought that the plan of storing the sewage in tanks was applicable to towns where the population was not excessive; but, at the same time, provision must be made for carrying off the storm waters, so as to keep the sewage as free from dilution as possible, and from the tanks the matter might be conveyed in an almost solid state and placed upon the land. He had nothing to suggest beyond bringing the subject before the Society and the public in a paper, and if no one else were prepared to bring it forward, he would willingly do so himself at a convenient time.

Dr. GILBERT agreed with almost every word that had fallen from Mr. Rawlinson, especially with regard to the great difficulty connected with the disposition of the sewage of large populations. There was no difficulty in settling what was the theoretical value of the excremental matters of a population; the difficulty was to know how to avail themselves of that value, whilst the sewage was necessarily diluted to the extent that had been spoken of. If there were no other reason for doubting whether in practice such a result could be obtained, if the excre-

mental matter were in a practicable form, the plan suggested by Mr. Rawlinson would be sufficient, viz., that the matter should be daily got rid of. It was probable that, during certain portions of the year, that matter would realise a considerable value for agricultural purposes, but at other times there would be difficulty in getting rid of it, even if it could be had for the mere carrying away; so that the theoretical value of the matter would not in any case be realised. It was a question he thought not yet determined whether the proper plan was to apply large quantities of sewage to limited areas of land, as the best means of utilising it. It was the opinion of many persons that the area of distribution should be considerably larger than was the case in the instances mentioned. If the distribution over the more extended area were adopted, he thought the cost of the operation would amount to a figure that had not been thought of. Supposing that during a portion of the year the sewage could be disposed of at its theoretical value, the question arose whether an engineer could distribute it, by means of pipes or other arrangement, at a price which would be anything like remunerative. His own opinion was that they could not, according to the present showing. If it could be shown that sewage might be distributed on the land at about a penny per ton, in a state of dilution like the London sewage, there were some hopes that it would be utilised in that way. The only suggestion he would throw out was whether the committee could obtain information as to the cost at which sewage could be pumped to a certain height and distributed over a given area.

Mr. THOMAS PEAKE, being connected with an important part of the country, Staffordshire, and having for some years past taken a deep interest in sanitary matters, he would make a very few remarks—first with regard to prevention of diseases, and, secondly, as to making the best use of the sewage of towns and villages. Those whose observations were chiefly confined to the metropolis had no adequate idea of the difficulties which presented themselves in a mining district like Staffordshire. When the local bodies of such a district were asked to deal with sewage, he would in the first place ask—what was sewage? It could not mean the immense torrents of water that swept down over the Staffordshire hills, bringing large quantities of detritus. It was surprising how small a stream the sewage of 10,000 inhabitants amounted to. If the towns were well supplied with water it somewhat increased the quantity of fluid denominated sewage, but if, as was too often the case, they were short of that important and indispensable element, it reduced the stream to dimensions so small, that gentlemen connected with the metropolis would scarcely believe him if he named the diameter of tube that would carry off the sewage proper of a town of 20,000 inhabitants. In the mining districts water was pumped from the bowels of the earth largely surcharged with mineral products, which caused the destruction of fish, and led noblemen and landed proprietors to feel a decided objection to what was termed sewage. He submitted that the water which was pumped from the seams of the mines which were worked for the benefit of the country would not be placed in the category of sewage, and he believed, in dealing with the ultimate disposition of the sewage, three statute acres of land would absorb the sewage of 1,000 persons. He thought that was even more than would be required, and when the beneficial results of the application of the sewage to the land were manifested, there would be plenty of applications for it, to save the expense of putting other manure upon the land. It would be an advantage both to the owner and to the lessee. He could mention an instance in which land that 45 years ago was nothing more than a cover for snipes and birds of similar habits, was now let at £5 per acre, from having been subjected to a course of sewage irrigation. By these means they not only added to the fertility of the soil and increased the amount of food of the country, but they rendered the

atmosphere of towns more healthy, and diminished the tendency to visitations of small-pox and cholera.

The CHAIRMAN then recapitulated the views of the several speakers, and remarked that he had no doubt the Council of the Society would be able to gather from them some points which would be worthy of their consideration. He was quite sure, looking at the cardinal objects of the Society of Arts, the Council would only be too happy if, in promoting sanitary improvements, a way might be found of benefiting the agricultural interest of the country at the same time, by the utilisation of the sewage matters in the manner that had been indicated by some of the speakers. The Council would feel indebted to those gentlemen who had favoured the Committee with their views, and he would suggest that upon any more definite ideas occurring to any members of the Committee they would be good enough to put them into writing and transmit them to the Secretary.

The Committee then separated.

EXTRA MEETING.

WEDNESDAY, JUNE 3, 1863.

An Extra Meeting was held on Wednesday, the 3rd inst., His Royal Highness the Duke of Cambridge, K.G., in the chair.

The following candidates were proposed for election as members of the Society:—

Doran, John, LL.D.,	{ 21, Royal-crescent, Notting-
F.S.A.	hill, W.
Galloway, Robert	{ 22, Florence-terrace, New
	Cross-road, S.E.
Harradine, Thomas	{ 7, Laurence Pountney-hill,
	E.C.
Phear, John Budd.....	{ 7, Fig-tree-court, Temple,
	E.C.

The following candidates were balloted for and duly elected members of the Society:—

Angell, Lewis.....	{ 8, Middleton-terrace, Merton-
	road, Wandsworth, S.W.
Craig, John.....	{ 20, Parade, Harleyford-road,
	Vauxhall, S.
Downes, Thomas Ring ...	{ 1, Park-cottages, Adelaide-
	road, Haverstock-hill, N.W.
Elderton, Edward M.....	{ 28, St. George's-square, S.W.
Elliott, John	{ 2, Finsbury-pavement, E.C.
Farthing, J. Johnson.....	{ 36, Great George-street, S.W.
Waine, William	{ Newington-butts, S.
Walker, Thomas	{ Speedwell House, Birming-
	ham.

AND AS HONORARY CORRESPONDING MEMBER,

Newbery, Joseph Vickers. | Shanghai, China.

The Paper read was—

ON THE RESULTS OF THE INTERNATIONAL EXHIBITION OF 1862.

By WILLIAM HAWES.

I have already had the honour of reading two papers before the Society on the Exhibition of 1862,—one in 1861, when our lamented President the Prince Consort presided, the object of which was to show there were sound reasons for believing that the then contemplated exhibition would fully realise the most sanguine anticipations of its success—and a second, in 1862, soon after the Exhibition had opened, when the Earl Granville, Chairman of the Commission, presided, in which I directed the attention of the Society to the evidence it afforded of our industrial progress in the preceding ten years.

I now venture to read a third paper, in which I shall endeavour to point out the results it has produced, and which it will probably produce, as well on future Exhibitions as upon the future progress of industry and art.

In the paper I read last year, I dwelt at length upon the lasting impression I believed the study of the varied and very beautiful contents of the Exhibition would make on the public mind, and expressed a strong opinion that our industrial progress, for years to come, would be most beneficially promoted by it. All who hear me will, I think, agree in the correctness of this opinion. The more practical and really useful character of the manufactures exhibited, and the great beauty of the works of art, place this Exhibition far above those of 1851 and 1855 in national importance.

Assuming that the Exhibition of 1851 gave us a true representation of the industry of the world at that time, we are now able to point in an unmistakeable manner to a rapidity of progress in ten years, of which the most sanguine advocate of International Exhibitions in 1851 would not have dreamed, and which could not have been accurately measured but for that Exhibition. This advance beyond the mark set in 1851 has not been confined to one country or to one people, but, though in different degrees, has been achieved, with one lamentable exception, by every country and people who then exhibited.

It may be said, however, this progress is not all to be ascribed to the Exhibition of 1851. No doubt that is so; but few will be found to assert that the direction it gave to industry, and to the interchange of knowledge and ideas between the artists and manufacturers of so many nations, did not powerfully stimulate the development of that great activity in commerce, in manufactures, in design, and in art, which has so decidedly marked the last ten years.

To one country it showed its industrial weakness, to another that it was dangerous to rely too much on its strength, and to all it read lessons of humility and of hope.

If, then, the interchange of opinions, the inspection of rival productions by thousands of people in 1851, who otherwise could not have seen them, did to any extent (and I believe it did to a great extent) assist in developing this increased perfection in every branch of art and industry which we have all witnessed, and which was so striking to those who, having carefully inspected the Exhibition of 1851, could compare it with that of 1862, what will be the effect, in the next ten years, upon the larger number of manufacturers and workmen who have studied with increased interest, knowledge, and skill, the very superior productions of domestic and foreign industry exhibited last year?

Have we not a fair right to assume that, as the field is wider, as the intelligence, skill, and capital brought to bear upon the industry of the world has increased beyond all former precedent, especially in India and in our colonies, so the result of another decade of the world's labour will show an advance as great and as remarkable—if not greater and more remarkable—in its practical character, beyond 1862, as 1862 has shown beyond that of 1851?

This, then, is one of the results which cannot fail to flow from the very much higher standard of excellence in every department of the Exhibition just submitted by the world's best workmen for public inspection and to public competition; and can anything show the confidence of superior skill and intelligence over inferior workmanship and ignorance, its freedom from jealousy and its liberality in a higher degree, than these periodical displays by all civilised communities of every industrial improvement, to the gaze of the world and to the examination of rivals, come from where they may? All intelligent workmen have learned that they gain more by zealously assisting to form such collections, and then studying them as a whole, than they could by years of patient toil, shut out from the stimulating effect of unlimited competition, and the advantages of unrestricted communication with the best and foremost men of the age.

If, then, these Exhibitions, originated just as the principles of free-trade were approved by this country, but also at a time when they were only to a small extent acknowledged, and to a still smaller extent practically adopted by the governments of foreign countries, have in one decade produced such wonderful results, what may we not expect when all the restrictions which now impede the freest intercourse, commercial, industrial, and artistical, between nations are removed?

That this result must follow from the vast amount of practical knowledge which the wisest and most influential minds, having great influence in the direction of the affairs of foreign countries, have received from the inspection of the collections of 1851, 1855 and 1862, appears to me to be the necessary sequence of events, and when that time arrives the world will proudly acknowledge the wisdom and foresight of that truly great and catholic mind which inaugurated these most benevolent, most liberal, most Christian institutions, which have so much hastened this desirable consummation; and proud will our countrymen then be of the great Prince to whom his adopted country will owe so much, but to whom the world will owe more, for the practical direction he gave at the right moment to a great and novel conception, and for the perseverance and ability with which he worked it out.

It seldom falls to the lot of one man, and still more rarely to that of a Prince, to originate a great idea—to take the foremost place in maturing it—to live to see its success in the highest degree, as well at home as abroad, and thereby to lay the foundation for industrial triumphs in generations to come.

But let us now turn to the results of the late Exhibition which can be now appreciated. The first to which I will refer are those produced upon foreigners.

The number of foreign exhibitors in 1851, was 6,566, and in 1862, 16,456, an increase of more than 150 per cent. The number of letters which passed between England and France in 1851, was 2,495,375, and in 1862, 6,175,191, an increase in eleven years of 148 per cent., and the increased number of foreigners who visited London, but of which there is no official record, may be estimated by the numbers who visited the Dockyard and Arsenal at Woolwich, which were 437 only in 1851, and 9,295 in 1862.

The number who visited and studied the works exhibited was, I believe, in a greater proportion still, and there is no doubt that the hospitable and liberal reception they met with from all classes produced feelings of cordiality, confidence, and respect, nationally of the greatest importance, and most gratifying to all who took an active part in the work of the Exhibition.

I believe the feeling of foreign exhibitors towards us in 1862 was of a very different character to that which existed in 1851, when national jealousy, which most effectually retards progress, was uppermost in their minds, but which is now, we have much reason to believe, displaced by a wholesome and friendly spirit of emulation and active competition, that must ere long enable, not only those who visited these international institutions, but nations at large, properly to appreciate the true character of each other.

In illustration of this view I cannot do better than quote the words of M. Michel Chevalier, President of the French Section of the International Jury, in his report on the Exhibition, addressed to Prince Napoleon, the President of the Imperial Commission. He says—"The character of the personal relations which have existed between the English and the French, at the Exposition of 1862, suggest a reflection and a hope. It is impossible that two people who voluntarily exhibit so much reciprocal regard—who have so many ideas and so many interests in common, can be permanently other-wise than allied in close friendship. This will not be for their benefit only but for that of all mankind." One of the writers in the "*Annales du Conservatoire Impérial*," M. Payen, says—"I declare it would have been impossible

"for me to discharge my duty as a Juror but for the extreme kindness of both French and English manufacturers. The graceful and most hospitable reception I experienced in England made my minute and comparative examination easy, interesting, agreeable, and very instructive."

But although the cultivation of such feelings by reciprocal acts of courtesy is of the greatest value in promoting the growth of a sincere and lasting friendship between the people of all nations, the influence it exerts in breaking through the unreasoning attachment to prohibitive duties and a protective commercial policy, which exists in the minds of the great bulk of foreigners, as it did in ours but a few years back, is slight, compared with that permanent impression produced upon them by their inspection of the rapid advance our manufacturers have made since they have met the unrestricted competition of all the world.

Many of the foreigners who visited this Exhibition recollected the trouble and annoyance occasioned by our customs laws and regulations in 1851. In 1862 they found them all but abolished. They knew the effect that similar laws produce in their respective countries, and the able body of foreign commissioners and manufacturers who attended this Exhibition, officially and otherwise, cannot be insensible to the fact, that in spite of free competition with all the world, we have made great progress in our old industries, and equally great, if not greater progress, in manufactures indigenous almost to foreign countries, and the superiority of which over ours in 1851 was most decided. To their surprise they found that improvement had been most rapid, in every important quality of excellence in the manufacture of silk, in the artistic decoration of china, and in the quality and workmanship of glass.

The conclusion to which the examination of the state of the manufacturing industry of the world in 1862, as compared with that in 1851, must lead them, appears to me to be irresistible, and will gradually force them, first to believe in and then to urge upon their respective governments the adoption of those sound principles by the application of which they see we have gained so much. Nothing but the actual inspection not of one, but of the great variety of articles exhibited, all telling the same tale, could effect such a change of opinion as is now in progress abroad.

Prohibitory and restrictive commercial laws have, it is believed, received a mortal blow in Europe. By the Exhibitions of 1851, 1855, and 1862, governments as well as people have been liberalised and enlightened, have yielded up national prejudices to the force of reason and experience, and now take broader and sounder views of the advantages, social and political, produced by unrestricted commerce.

I cannot dwell longer on the beneficial results produced on the minds of foreigners by the examination of this Exhibition and the cordial manner in which they were received; but, satisfied as we must be, with their all but universal admission of our remarkable progress, and their tribute of praise to our system of legislation which has so much promoted it, we must not forget that that admission by them becomes the most powerful stimulus to exertion, and obliges us, if we are to maintain our position in the industries of the world, not to relax our endeavours to advance in the coming ten years fully as much as in the past; or our neighbours and rivals will assuredly reach our standard, and probably pass it, in the race for superiority.

Here, then, is the second result of the greatest value to us nationally, arising directly from the Exhibition. Admit International Exhibitions to be institutions of world-wide utility; admit them as a necessary part of the commercial machinery of the world, and their recurrence at given periods is certain—becomes, indeed, a necessity; and you thereby oblige every artist, every producer, every manufacturer to exert himself to the utmost to

maintain his national reputation and his own position, securing thereby to the world at large the best, the cheapest, the most useful, as well as the most beautiful applications of human industry to the production of every article, required alike for the necessities and for the luxuries of life. You increase the range of human wants, and, at the same time, by the united and almost unconscious exertions of all, provide the means by which they can be most economically supplied. You elevate the taste, and enlarge the sphere of enjoyment to the great mass of mankind.

It has, however, been objected, that by stimulating foreign industry we increase the difficulties of our workmen.

It is notorious that a large number of exhibitors whose success last year has been fully admitted, and most of whom have, I believe, derived great benefit from it, would, two years since, have rather discouraged than encouraged the then proposed Exhibition.

They were contented to rest upon their well-earned laurels, and perhaps feared competition with younger and more active spirits, whether English or Foreign. But I have not heard of an instance in which old firms, who were, we may truly say, obliged, and many unwillingly, to enter the lists, have been found wanting. Every appliance younger competitors can adopt to secure success must be more easily available to their older rivals. Great changes in taste and design are rarely effected by an individual effort, they are introduced gradually, and it must be the fault of every old and hitherto successful exhibitor if he allow others to pass him in the race for public support.

Indeed, I fear the tendency of Exhibitions is rather to increase the difficulties of young and new exhibiting firms and individuals than to injure old ones. Everything exhibited by well-known names first attracts attention, and if their reputation be maintained, they will not be harmed in the encounter with the world; indeed, I believe that, on the contrary, the stimulus which the necessity for exertion imposes upon them, ensures on their part corresponding endeavours to excel, which amply repay them in the long run for the time and labour expended in the struggle, and ultimately make them the most earnest supporters of International Exhibitions. This, then, is the benefit we derive at home from Exhibitions. Everyone is stimulated to exertion, to invention and to improvement, by the pressure of a power before unknown. Apart from our competition with foreigners, which cannot but be useful, a wholesome rivalry is created among ourselves, and so long as that exists in full force, we need not fear that any foreigner will excel us in those branches of industry which our soil, our natural and mineral products, our climate, our capital, as well as our perseverance and untiring industry make peculiarly our own.

If we have an industry the offspring of vicious legislation, founded on prohibitive duties, it must, and ought to, fail in the world's competition. The sooner every country discovers what it can produce best and cheapest, and then exerts itself to supply such commodities to all the world in exchange for others it cannot produce so advantageously or so cheaply, the greater will be the prosperity of all, and then perfectly free trade, and the freest interchange of scientific and practical knowledge, will become the test of progress and civilisation, and every economy in production and manufacture, wherever and by whomsoever discovered, will benefit every country alike.

Let us next endeavour to trace the practical result which may be fairly said to have followed the inspection of the articles exhibited.

First, as to Painting and Sculpture. The incompleteness of an Exhibition without a collection of pictures was so universally felt in 1851, that nearly the first condition made by the Council of our Society, when negotiating with the Commissioners of 1851, was that a collection of modern paintings should form a prominent feature in the proposed Exhibition of 1862.

As soon as this point was decided, the erection of proper

galleries, to secure the safety and proper display of the most valuable collection of works of modern art ever brought together, followed as a matter of course, and thus certain conditions were imposed upon the Commissioners in their selection of plans for the building, which necessarily gave it an entirely different character from that of 1851.

Picture galleries of the dimensions required, so lighted as to do justice alike to paintings in oil and water colours, so ventilated as to secure the pictures from injury arising from great changes of temperature and in the conditions of the atmosphere, had never been erected in this country, and the successful manner in which these difficulties were met, and so many pictures of every possible variety of subject and treatment so well exhibited, and then returned to their owners uninjured, reflected the greatest credit on the architect of the galleries, and upon those who arranged the pictures, Mr. R. Redgrave, R.A., and Mr. Creswick, R.A.

It was, I believe, admitted by the artists of all countries that these galleries afforded them better opportunities of studying the various schools of modern art, and of comparing school with school, than they had ever before enjoyed.

From the gallery we will turn to the pictures:—

So magnificent a collection of the works of our English masters, living at the commencement of the period within which pictures were admitted, has never before been brought together. The works of Hogarth, Wilson, Reynolds, and Gainsborough, were all, or very nearly so, of the finest quality; but I venture, with great diffidence, to express an opinion that the same full and ample justice was not done to the reputations of the very distinguished artists who lived in the next period:—Lawrence, Callcott, Wilkie, Constable, and Leslie—many of whose finest works were not to be found in this collection.

With regard to the pictures of artists now living, I think, to some extent, the same remark is applicable, but considering the English collection as a whole, we must admit—though many of the finest pictures, painted within the last fifty years, were not exhibited—that it was a collection well calculated to maintain the reputation of the English school in the estimation of foreigners.

I feel great difficulty in hazarding an opinion as to how far the pictures by foreign artists adequately represented the present state of art in their respective countries.

The Austrian Commissioners state emphatically, in their official catalogue, that the space allotted in the galleries to Austria was far too limited to admit of an adequate representation of the progress and present state of the artists.

This is the more to be regretted, as, in the words of the official report, “it prevented that complete comparison between British and Austrian art which would have excited much interest among the English public on account of the analogies between the tendencies of modern German art and those of English art.”

The remarks upon the recent progress of the fine arts in Austria are also interesting, for, whether tested by the progress of painting, sculpture, or architecture, we are told that, “whoever views with impartial eyes the intellectual movement and the artistical activity now alive in Austria, must come to the conviction that the movement is intense and follows an ascending direction;” and the report concludes by hoping that the “new era of civil and religious liberty inaugurated by the spontaneous will of the Emperor may promote the increase and progress of the peaceful art assembled in the London Exhibition as in a temple of peace.”

The French pictures, though sufficient, I believe, to convey an accurate knowledge of the present state of that school, were limited, as ours were in the French Exhibition in 1855, to works executed within the previous ten years, and therefore did not show the progressive advance of painting in France; but their excellence was very generally, though I think not so universally, admitted as this fine collection of pictures deserved. In colour, taste, and

feeling many of them were unsurpassed, and it is much to be regretted—though it was unavoidable—that the examples were limited to the most recent productions of French artists.

M. Chevalier, in his report, to which I have before referred, states that—“The French Commission did not adopt the limitation fixed by the English Commissioners, because, independently of the impossibility of having space sufficient for the exhibition of the works of French artists of the last century, all their principal works are open for public inspection in their public galleries, and are well known to artists and the public, whereas those of more recent date are little known, being dispersed all over the country, in various private collections; and that, therefore, as there could not be room for all, it was better to exclude older and known works than those of living artists.”

No doubt it is very difficult for us to form a perfectly impartial opinion upon the real or comparative merits of foreign pictures, as compared with our own, the subjects and the mode of treating them, being so different from those we are accustomed to admire. The English unprofessional eye, trained for the most part by the study of a limited number of examples of ancient art and of our own school, can hardly be expected at once to estimate correctly the merits of the composition, the drawing, or the colouring of French artists, whose pictures—more imaginative, more accurate in drawing and composition, but less vigorous in colour and expression than our own, require continuous as well as careful study to be thoroughly appreciated, and the want of which I think has led us rather to underrate the position they are entitled to hold in the world of art.

Upon the comparative merits or the special beauties of the pictures exhibited by the Belgian (which were second only to the French), Dutch, Italian, Danish, and other foreign schools, I have not time to dwell, but judging from the pleasure afforded to the large number of persons who inspected and admired them, it is impossible not to arrive at the conclusion that public taste must be refined, and the appreciation of art enlarged, by the knowledge we have thus obtained of the beautiful works produced by foreign artists; nor is it, I hope, too much to expect that our younger artists may by their study see the importance of avoiding that mannerism which is too apt to characterise every school, and by taking high and comprehensive views of the objects of their art, not condescending to paint down to the tastes of the uneducated, or to produce a sensation at the expense of honesty and decorum, may help to elevate the moral tone of the country, to prompt to what is good, noble, and generous, to raise our national school to a higher point of excellence than it has hitherto attained, and thereby to mark the Exhibition of 1862 as a starting point in the history and progress of our English school of art.

The limits to which I am confined oblige me to be very brief in my observations on the sister art; but having referred to painting, I may not omit to notice the sculpture contributed to the Exhibition. If supply may be taken as a fair test of demand, sculptors have no cause of complaint. The number of works exhibited amounted to many hundreds, of which by far the greater proportion were by British artists. Taking into account only the best works contributed by all schools, foreign and native, it is gratifying to feel that England had no cause to be ashamed of the sculpture she could produce. At the same time it is to be regretted, that owing to the very large number of works admitted, seemingly without selection or discrimination, our cause was injured by the quantity of mediocre productions that were forced into notice, and overwhelmed the better works of which our school showed itself capable.

France exhibited great power in mastery of form, in drawing or knowledge of the figure, and in *bravura* of subject and execution. No works of any country were superior to these in artistic qualities. The character of subject fell short of the execution. It usually appealed

rather to the senses than to the higher feelings and sentiments—a most dangerous tendency, in this art especially.

The sculptors of Italy, of the German and cognate schools, and of America, showed there was everywhere great increase of power in their practice of this art.

But all sculpture, to be good, must be founded on certain fixed principles, approved and established by the verdict of ages; and, therefore, though the choice and character of subjects may indicate individual tendencies, the material representation of these should be limited by the application of approved formulas, such as beautiful form and a grand style of treatment, of which the best examples are found in the highest class of Greek sculpture. This, while it prevents that national classification of schools which may be made in painting, will always, to a certain extent, keep sculpture exotic; for, though no one can desire to see obsolete classical subjects and figures constantly repeated by modern artists, sculpture cannot easily nor be safely adapted to ordinary every-day subjects, and to modern and peculiar national habits.

This temptation to use an art most limited as to means, namely, Form only, to address the same class of feelings and sympathies as can only be awakened by painting, with all its appliances of colour and effects, is a constant endeavour with a certain class of sculptors who cannot, or will not, recognise the simple conditions on which alone this art can be safely practised. The consequence has been that while, on one hand, some sculptors have only re-copied Greek ideas and Greek modes, till in their tame repetitions the art has had no life or meaning to modern intelligences, on the other, in order to gain popularity, the art has been lowered either to what is meretricious and sensual, or common-place and familiar, or to the trifling and, so to say, clap-trap.

It was generally felt by thoughtful and competent critics that the appeal of some of the best works in sculpture was to the lower sensibilities—to the eye and the mere sense rather than to the heart and mind; that the nobler objects to which a severe and chaste art should be devoted, namely, to teach and to elevate by means of beautiful forms, were too often sacrificed either to mere school art, that is, the academical display of the figure, male or female, or to clever but mechanical execution, or to such subjects and such technical treatment and accessories as should catch the lower class of popular applause. Thus many such productions, certain to please uncultivated persons, occupied attention while better works were neglected; and the unworthy and tricky artifices, which gave to performances the character of toys and fancy work rather than true sculpture, were run after, while more chaste works, that were capable of improving the public taste, were passed by unnoticed and unappreciated. Still, it is a subject of congratulation that there were many productions of this higher class to encourage our hope of the future success of sculpture, and in lamenting the want of more general appreciation of these, we must bear in mind how little care has been hitherto bestowed in educating the public, high and low, in the value of art, or in teaching them how to judge it.

I conclude I would venture to say, that the executive power shown in this art proves that it is not the hand that fails to procure a high position for modern sculpture; and we may, therefore, indulge the hope that, with this important element of success secured, the higher objects of the art may in time be nobly carried out. Nothing but the best results, to this highest branch of fine art, can arise from the opportunities this collection afforded for the study of the best works of sculptors of so many nations.

Passing from fine art to the consideration of the effect which the increased appreciation of art in this country has produced on design applied to our manufactures, it was universally admitted that the improvement of our taste and workmanship had been most remarkable in the last ten years, and that the effect of the study of the forms and colours of foreign models in 1851, improved upon by the more

intimate acquaintance with foreign manufactures which our recent commercial policy has encouraged, was apparent in every branch of industry, from the designs for the commonest crockery, or the most useful articles of ordinary furniture, to those of the most costly china or articles of *vertu*; a beautiful form is now found to be as economical in production, and more saleable than an ugly one. The pleasure it affords is constant, and every new elegance of form applied to articles used in every-day life, tends to ripen, by imperceptible degrees, the general taste of the country; and should the rapid progress of the last ten years continue, it will soon be as rare to see an ugly form as a few years back it was to find one with any pretension to beauty or taste.

I will next briefly review the Jury Reports, and endeavour to show from them the extent of industrial progress since 1851, and to indicate, where it is possible, to what extent this progress has been stimulated by that Exhibition. I cannot do better than introduce this part of my subject by again quoting from the official report of M. Chevalier, who records his opinion that “the Exposition of 1862 was a great success,” and that “in most branches of industry better things are now produced at less cost, and that man has acquired a new degree of productive power.” He illustrates these remarks by referring to the rapidly-increased application of steam-power to agriculture—to the increased perfection of mechanical tools—and to the almost magical changes now produced by chemistry; and expresses with warmth the great satisfaction “there is in making a voyage round the world without leaving an apartment decorated with objects of art—with *chefs-d’œuvre* of industry—with tropical plants, and refreshed by fountains.”

In Classes 1, 31 and 32, Metallurgy, Hardware, Iron and Steel, it was generally acknowledged that the information gained in 1851 materially contributed to the great perfection these industries have now attained.

The recollection of the deficiency in these classes in 1851 produced the best results upon the collections of minerals, of metallurgical and geological specimens just exhibited, and the importance of affording to the public the fullest information relating to the wealth of mineral properties at home, abroad, and in the colonies, induced foreign governments, our Indian government, and many owners of such properties to exhibit such magnificent geological and mineralogical maps, and to prepare specimens so ample, and collections so complete and well arranged, as to afford opportunities for study that have never before existed; but one remarkable fact connected with many of the most important of these collections is, that they were exhibited by companies and individuals who can derive no pecuniary gain from their Exhibition, and who incurred the labour and expense for the honour of their craft, and with the worthy ambition of contributing their part to the friendly concourse in which all the world was invited to join.

In Class 1 the number of exhibitors was double that of 1851. Great progress was shown in the production and manipulation of the rarer metals. Platinum, which, till lately, was only fusible in small quantities, has now been fused and worked in a mass of above 3,000 pounds weight. Aluminium, recently produced only in the laboratory, and sold by the ounce, is now manufactured and sold by the pound. Iridium, almost unknown, commercially speaking, in 1851, was shown in considerable quantities, and perhaps the best tribute to the excellence of the specimens exhibited in this class is to be found in a paper in the last number of *Silliman's Journal*, by Mr. O. C. Marsh, who says that this class offered a “fuller and more instructive collection of objects than had ever before been brought together,” and that “the specimens of platinum and its associated metals were among the most interesting objects in the Exhibition.”

In Classes 31 and 32, Iron and Steel, the Jury reports great progress, and that steel was shown in masses and applied to purposes equally unknown ten years since; and

Mr. Marsh, in the paper in *Siliman's Journal*, to which I have already alluded, says, "that the collection of iron ores, and the manufactures from them of iron and steel, were far superior, in many respects, to anything before made, showing however greater facilities for production and application, than new scientific information." He directs special attention to the products of the forges of Bessemer and Krupp. To these classes M. Chevalier also pays particular attention. He carefully compares the state of this manufacture in France with that in this country and in Prussia, examines most attentively the steel produced by Bessemer and Krupp, and gives a most interesting account of the general development of the trade.

The Jury report in reference to the improvements in the manufacture of steel and iron, that although in the past ten years—1851 to 1862—177 applications have been made for patents, and 127 patents have been actually granted, only one has produced any striking change, or been attended with really practical and commercial results.

Class 2, Chemistry. The reporter considers that the progress during the past decade has been as great, if not greater than in any other of the classes in the Exhibition.

"He states that manufacturers English, and Foreign, have in many instances exhibited their processes of manufacture with a liberal disregard of trade secrets, with an ardour to disseminate useful knowledge worthy of these noble occasions, and that the English contributors have in 1862 outdone their admitted superiority in 1851."

It is impossible to do more than notice the elaborate treatises on the chemical manufactures of Great Britain and Europe, which will render this report of great value to the scientific chemist and to the practical manufacturer. They will mark clearly the exact state of each process in 1862.

The references in the notes evince the anxious desire of Dr. Hofmann to afford to the public every possible means of obtaining, if they desire it, fuller information on every subject on which he treats than he is able to insert in the report.

To show the admirable spirit in which this report is written, I will quote the following passage from the introductory observations:—

"During a survey of the Exhibition of 1862, the visitor cannot fail to be struck by the astonishing rapidity with which industry, in this country more particularly, assimilates the discoveries of science, gathering, so to speak, the ripe fruit of practical result from the seedling of theory only just sprung into existence; seizing upon new laws ere yet fairly ripe for enunciation, and boldly founding great manufactures upon laboratory researches themselves incomplete. So closely indeed does practice now tread upon the heels of theory, that the philosophical chemist is often quite astonished to find as the result of his purely scientific researches industrial improvements he did not foresee and often cannot fully explain."

In Class 5—Railway Plant and Locomotives—the Jury report that there were but few absolutely new machines, but that there was a marked improvement in all the details of construction; and with respect to manufacturing machines and tools, and Class 7, machinery in general, the report says that although there was but little real novelty, yet throughout this large branch of trade, including the manufacture of machines for working up cotton, wool, and silk, there was greater simplicity, greater capability for production, with increased cheapness and superiority of workmanship over 1851.

In Class 10 the great engineering works designed and completed in the last 12 years, are noticed, and their superiority over similar works of an earlier date, owing to the increased application of iron in their construction, as well as by its use as a means of construction, is dwelt upon.

Class 12, Naval Architecture. The Jury report dwells at much length on the changes effected since 1851. Then there were only a few steam frigates and but one steam line-of-battle ship; the increased use of iron instead of wood in their construction, and the new ordnance exhibited in

Class 11 have together given a new character to the industry employed in naval architecture.

I think the impression produced on Englishmen by the examination of these classes must have been that of great security—and on foreigners, that of our power to protect and preserve that security inviolate.

Class 13, Philosophical Instruments, Electric Telegraphy, &c., the reporter informs us in this very elaborate report that whereas in 1851 the electrical instruments exhibited were few in number, in 1862 they were numerous and excellent; and that whereas in 1851 telegraphic apparatus was exhibited by but two foreign exhibitors, a fair proportion of all exhibited in 1862 came from abroad.

No great discovery in electric science is reported in the past ten years, or any new applications of its principles; indeed, many sanguine expectations then entertained remain unfulfilled. There has, however, been a great extension of the system of electric telegraphy since 1851.

In Great Britain there are now above 50,000 miles of wires against 10,000 in 1851.

In Europe there are more than 100,000 miles now in use; in America, 50,000; and in Australia, in the colony of Victoria, 1,300.

The improvements in telegraphic apparatus are important as regards workmanship, in increased simplicity of construction, and in the delicacy and susceptibility of the parts, to protect which 465 patents have been obtained since 1851.

The tendency as the discoveries in this branch of science proceeded was to attribute to electric forces greater power than they possessed, and various pretty toys were invented to illustrate it. But these have all given way before the influence of the discovery of the definite measurable correlation, or equivalence, of various physical forces.

In this class, then, as in most others, great progress is manifested without new invention, and the reporter has taken great pains to point out the amount and direction of that progress since 1851, and so clearly and accurately to record the position of electric telegraphy in 1862, that at a future time we shall be able to ascertain exactly the extent and value of whatever improvements may have been introduced.

The reporter on Philosophical Instruments, whilst regretting the absence of several of our most distinguished makers, admits great excellence on the part of those who do exhibit, and gives to Mr. Buckingham the credit of exhibiting the largest achromatic object glass in existence, 20 in. in diameter. The report states that the display offers no index to the existing state of this art, and refers in evidence of this statement to the important instruments recently supplied to our Royal Observatory, and to those of Oxford, Cambridge, Edinburgh, the Cape of Good Hope, and Paris, as well as to our distinguished observers, Mr. Lassell, Mr. Nasmyth, and Mr. De la Rue.

The reporter calls attention to the inability of the jury to test the real value of the instruments exhibited, and states that the awards only mark an approval of the design and execution of the mechanical part of the instrument, and have no reference to the more important qualities for which the instrument was constructed, and which no doubt accounts for our best makers not exhibiting. The binocular microscope is the great novelty in this class, and has created a new era in the history of the microscope.

Class 14, Photography, is a new class since 1851. In that year the few pictures exhibited were hung among the philosophical instruments, and even so recently as 1855 they were placed with printing and paper-hangings. Now, though still in its infancy, it has risen to an important branch of art and industry, promising wider development and more important results. Since 1852, 200 patents have been issued relative to the apparatus used in this class.

The reports on Classes 18, Cotton; 20, Silk; 21, Woollen Goods; 22, Carpets; and 23, Woven, Spun, and Felted Fabrics, are most instructive.

On cotton the Jury report : "Great improvement is observable in this manufacture as compared with the former exhibition." The use of improved machinery in Europe has equalised the products of nations. The new French combing machine, an invention of surpassing ingenuity, has rendered a degree of excellence attainable in the finer numbers of yarns which was previously almost impossible. English cotton velvets, scarcely shown in 1851, are now made of great excellence and beauty.

The muslins of "Tarare," manufactured by M. Thive Michon, and said to be the finest in the world, leave nothing to be desired, and are produced by the combination of the highest numbers of French and English yarns.

Switzerland in its finest muslins competes in quality and cheapness with those of Tarare, and specially excels in the cheapness of the cotton goods made by hand. Austria and the Zollverein, each send goods of high quality, and each has a speciality—Austria its chemille shawls—the Zollverein its thick coloured cotton cloth.

On Class 20, Silk, the Jury report that notwithstanding a great variety of discouraging elements, our progress has been remarkable in design, colour, and texture, and this applies as well to *moiré* antiques and fancy goods as to ribbons, in the manufacture of which the Coventry manufacturers have made rapid progress.

The French fully maintain their acknowledged excellence, though the difference between them and the manufacturers of England and the Zollverein is less obvious than it was in 1851.

In Classes 21 and 23, Woollen Goods, the report records most rapid progress and development since 1851—all ordinary rates of improvement it says have been far surpassed, and the magnitude of the results exceeds the most sanguine anticipations.

So remarkable is the improvement that has taken place in the manufacture of harness and Jacquard loom woven shawls, that this has become truly high art weaving, and our Scotch manufactures, one and all, show a marked advance, which, if continued, will enable us to rival Paris productions.

The greatly-increased supply of wool, improved machinery, superior skill in dyeing, and more beautiful dyes, have all contributed to produce more beautiful fabrics and to cheapen their price, and much of this improvement the reporter attributes to the information which the Exhibition of 1851 diffused among manufacturers.

The progress appears to have been most decided in Austria, where, instead of being content to imitate the manufactures of England and France, they have displayed most creditable originality; and the Jury report that the Austrian goods exhibited are the ordinary productions of the various districts from which they came, and were not prepared with a view of unfairly inviting commercial operations.

Belgium appears to have studied the production of goods of the cheapest class, and is now a most formidable rival to our Yorkshire manufacturers. She does not maintain her old reputation for fine quality.

France, in the words of the report, has sent goods "which are models for others, as nothing can excel their superior quality and generally excellent finish."

Spain, in 1851, showed nothing worthy of notice in woollen goods, but has now obtained several medals and honourable mentions.

The Zollverein is not perfectly represented in this branch of trade, and stands low in the award of prizes, of which France obtained the largest per-centage, in proportion to the exhibitors, England the next, then Sweden, Spain, Austria, and the Zollverein.

In Class 28 (Paper) the Jury express regret that only eleven English paper-makers were exhibitors, the number being the same as in 1851, whilst the increase of foreign exhibitors was very considerable, France supplying 17, Prussia 20, and Italy 10, out of a total of 95.

The Jury report that the general market value of the

British specimens in 1851 was much higher than that of 1862, whilst the foreign makers present to our notice a much larger proportion of high-class papers made from rags than they then did.

Great attention was directed for a time to the discovery of a new material for the manufacture of paper as a substitute for rags, but, notwithstanding the offer of the large prize of £1,000, by the proprietors of the *Times* for a good paper made from any material except rags, and the general stimulus which was given to invention by the contemplated scarcity of rags, no important discovery has been made, and that, notwithstanding large quantities of paper are made in England and abroad, from straw, esparto, and other fibres, all first-class printing and writing papers are still made from rags. Very beautiful specimens, made from maize fibre, were exhibited in the Austrian department. The reporter adds that, although since the passing of the Patent Law Amendment Act in 1852 to the close of 1857, 147 patents were obtained for improvements relating to paper, he is not aware, with the exception of those relating to straw and esparto, that any of the above patents have come into profitable use. Since 1857, 229 patents have been taken out, with I fear very similar results.

Class 29, Education, a class of much importance, which was not recognised in 1851—thus specially marking the increased attention now devoted to everything calculated to raise the mental and moral condition of the people. Great interest was manifested in the examination of the educational appliances of our colonies and of foreign countries, and in comparing them with our own.

The reporter for this class carefully compares the statistics of instruction in Austria, France, Prussia, Holland, Upper and Lower Canada, and the colony of Victoria, but regrets that he is unable, for want of information, to furnish, respecting the state of instruction in Great Britain, any figures approaching in completeness to those given for other countries.

In Class 30, Furniture, the report tells us of a great advance in workmanship, tending particularly to economy of production, but not in originality of design or ornamentation.

I cannot devote more time to the examination of these reports; on the whole they are carefully drawn, and so minute in their details, that future progress in each class will be easily measured; but it is very much to be regretted that the reporters did not more minutely compare the present state of each industry with its position in 1851, and record the progress, whether in new inventions, manipulative skill, improved taste in design, or increased cheapness, made in each class in the eleven years.

I fear that by this omission one of the most important of the objects of International Exhibitions, and on which the Prince Consort laid the greatest stress, has been lost sight of, and a great means of usefulness neglected.

The Colonial and Indian departments next require very special notice. In 1851, but 19 colonies were represented—in 1862, 31, exclusive of India. The collections of natural products—animal, vegetable, and mineral—from India, our colonies, and those of France and Holland, were of the greatest interest, and could not, except at an International Exhibition, have been so perfectly brought under the notice of the naturalist, the statesman, and the man of business.

They marked, especially by the scientific and practical knowledge displayed in the selection and arrangement of these magnificent collections, the progress of communities who carried with them to distant climes the habits and wants of their mother country, returning to her food and raw materials of the finest quality, and in unlimited quantity, nearly all gained from lands which but a few years since were unproductive.

It is, then, in the intimate acquaintance which these recurring exhibitions afford of the value and abundance of the products of the distant possessions of European Go-

vernments, that we may discern one of the greatest benefits which they confer on our industrious classes.

The competition and rivalry produced between our own and foreign colonies by the exhibition of their respective products is no less beneficial to the world than that produced by the exhibition of the works of competing European manufacturers. The results may not be so easily measured, though they can hardly be over-estimated. It is one thing to read on such subjects, and another to see collected together, and on a large scale, specimens of everything calculated to be useful to man which our colonies produce.

Impressions thus vividly made on the mind are not soon forgotten, and it is hardly possible to conceive in how many ways they may be turned to profitable account. May we not, then, fairly ask, after the examination of these evidences of the vast wealth of our colonies and possessions, where is the Englishman who can desire to weaken, or even to disturb, the cordial feeling which now exists between them and the old country; or who will risk, by petty parsimony, the untimely separation from the mother country of such sources of strength and power?

What is our annual expenditure in connection with them to protect the persons and property of so many Englishmen, all contributing, by their energy and industry, to the prosperity of the empire, even if it be as large as some I think unfairly represent it to be, compared with the mines of wealth they have in store for us, with the friendship of the active and increasingly intelligent population so rapidly developing its power, or with the moral view of the question which makes England and Englishmen the foremost in diffusing civilisation and Christianity in all parts of the world.

I regret that there should be those who do not value the great results necessarily emanating from a wise and liberal government of our Colonial Empire, and who only see the present and judge of it in the narrowest spirit, as though the *maximum* effect of our colonial policy was already reached, instead of being in its infancy, and who attach no importance to the political and moral influence which belongs to this country, as the founder of such great communities, nor value the influence it must retain, when in the course of time, that spirit of independence which it is difficult to eradicate from the Anglo-Saxon mind, leads the colonists to the conclusion that they possess wealth, strength, and intelligence enough to govern themselves.

When this time arrives, as it certainly will, may we separate as nations acknowledging each others power, greatness, and intelligence; and speaking the same language, having the same ends in view, may our efforts be devoted to the promotion of each others prosperity.

But, impressed as I am with the importance of the duties the possession of this great power and influence imposes upon us, I cannot leave this portion of my subject—though I ought to apologise for the digression—without referring to the deep interest with which everyone must reflect upon the injury the moral tone and the upright manly character of the young and rising people in our colonies may sustain, if England looking only to temporary relief to herself, continues to supply them with population by compulsory emigration, embracing only one sex, and the vilest of that sex.

The supply of labour to a colony will, I humbly submit, be very dearly bought by drawing it from the most lazy, most vicious, and most polluted sources in the mother country. As an ardent admirer of our colonial system, as a sincere well-wisher for its prosperity, and a careful observer of recorded facts, I earnestly hope our colonies will not now, or at any future time, allow any addition to be made to the number of our criminal population they have already received.

To sum up then, the effect produced by the study of the collections in the Indian and Colonial Departments, I would say that comparatively few of those who inspected them had previously more than a vague idea of the wealth

and productiveness of the colonies, or of their progress since 1851. The introduction of railways, of electric telegraphy, and other important public works, as well as the discovery of gold and the accurate survey of unexplored lands, have together contributed to produce the great practical result indicated to us by the vast increase in the past ten years of their imports and exports, and I cannot doubt that the contemplation of these evidences of the bounty of Providence, will strengthen in the national mind the conviction of the importance of these possessions to the empire, and will enforce upon Parliament the necessity of removing from them, as far as it is possible by imperial legislation, every impediment to the freest commercial and political action.

I must not omit to notice the interesting collections of the industries and natural products of China and Japan. But, beautiful as they were, it is difficult to discover any material progress since 1851 in the application of their acknowledged ingenuity and taste to useful purposes, or to trace in their works any result of their increasing intercourse with European nations.

I will next consider what are the results of our experience in 1862, with reference to the management of future Exhibitions.

First. As to the Constitution of the Commission—its expenditure and receipts;

Secondly. As to the appointment of Juries and the system of Awards of Prizes; and

Thirdly. As to the circumstances which must guide us in determining when another Exhibition shall be held.

The principles on which the Commissions of 1851 and 1862 were constituted are essentially dissimilar.

That of 1851 embraced representatives of all classes—Members of both Houses of Parliament, members of large commercial and manufacturing establishments, and members of scientific bodies.

Scarcely a question could be raised on which one or more of the Commissioners could not afford practical information. This gave confidence in, and weight to, the decisions of the Commissioners. There were also several important Committees—the Building Committee, for instance, which greatly assisted the Commissioners. Under them, there was a large staff of able and zealous officers.

In 1862, the Commission consisted of only five members, who endeavoured to apply the rules and arrangements of 1851 to the management of 1862, but without the machinery by which they had been successfully worked.

The highest executive authority had not, within itself, the deliberative or creative power of the Commission of 1851, and the staff was very differently constituted. The adherence at first to precedent was probably too strong, and there was too great self-reliance on the part of some who were employed, which, when new and unforeseen difficulties arose, very much increased the labour and responsibility of the Commissioners, and interfered with that regular and harmonious working which was contemplated. There was not the practical knowledge and advice to fall back upon, or the physical strength to carry on the work which was available in every emergency in 1851; so that, notwithstanding the untiring energy of the Chairman, Lord Granville, and especially of his colleague and our colleague, Sir C. W. Dilke, and the invaluable services of the Secretary, Mr. Sandford, the work was too much for the Commission. This led to hurry and confusion at times, which the constitution of the Commission on the same principles as that of 1851 would have precluded. We hope, then, whenever another Commission may be issued, the precedent of 1851 will be followed rather than that of 1862.

Next as to receipts and expenditure. In 1851, a guarantee fund of £250,000 was subscribed at the last moment, by a comparatively small number of individuals. In 1862, before any decided step had been taken to prepare for the Exhibition, a guarantee fund, of nearly half a million sterling, was subscribed by representatives of all classes—Peers, Commoners, and men

of business—to cover any deficiency which might arise from an excess of expenditure beyond the receipts, and this large sum would have been considerably exceeded had the railway companies carried out the arrangement for a joint subscription to this fund, which was originally proposed.

The great success of this, the first step, proved the popularity of the undertaking, and perhaps gave an undue impetus to expenditure.

I cannot leave this part of my subject without noticing the services of the officers of our Society in the cause of exhibitions.

It may be thought that the acknowledgment by the public of the energetic assistance rendered by this Society to the cause of International Exhibitions includes that afforded by its officers, but there are officers to whom justice is not done by such indirect praise, and in placing on record my very strong opinion that the success of all the early measures connected with the Guarantee Fund, and of the negotiations with the Commissioners of 1851, was very materially promoted by the steady perseverance, knowledge, and tact of our officers, and especially by the exertions of our valued friend and secretary, Mr. Foster, I am only doing a tardy act of justice.

I am unable to give the particulars of the receipts and expenditure, as the report of the Commissioners is not yet published, but these details are of little importance, as my present purpose is not to enter upon a criticism of this or that expenditure, or to inquire whether one or the other might have been avoided. My object is to place a broad and general view of the results of the Exhibition before you, for which it is sufficient to say the receipts from various sources have covered the expenditure. I will therefore only add that I think scant justice has been done to the very great exertions of the Chairman of the Commission, Lord Granville, and his colleagues, for the heavy responsibility they undertook in directing this great undertaking. The sterling interest in the industrial progress of the country, which urges the voluntary discharge of such laborious duties by men of the highest rank and station, can only arise from a noble spirit of public duty.

We, the members of the Society of Arts, must feel deeply grateful to them. They undertook the direction of this work, believing all their labours would be encouraged by the active personal support of our late Royal President, of which they and the nation were so suddenly and lamentably deprived, as also by the countenance and support of the Royal Family. They entered upon their duties before the great calamity of the present day—the Civil War in America—had begun. It is needless for me to enlarge upon the effect on the receipts of the Commission, and the increase of labour and anxiety imposed upon them, in consequence of these unfortunate but deeply lamented events. I would rather ask you to consider how great would have been the *éclat* attending it, and how great would have been the pecuniary success, had the Exhibition received the inestimable advantage of the constant presence of the Queen, the Prince, and the Royal Family, and the still greater success which would have attended the festivals had they been presided over in 1862 as they were in 1851. Without this support in 1851 the Exhibition would probably have been a comparative failure; without it in 1862, thanks to the soundness and universality of the principles on which such international gatherings are based, we have accomplished a great success, greater indeed than that of 1851, when the unforeseen events of 1861–62 are fairly appreciated, and the difference between the wet summer of 1862 and the fine summer of 1851 is allowed for—11·94 inches of rain having fallen on 71 out of 159 days in 1862, whilst 6·91 inches only fell on 53 days out of 141 in 1851; nor must we forget the effect produced upon the receipts by the rival attractions, to visitors from the country, of the Crystal Palace and the South Kensington Museum, both of which popular and instructive places

of public amusement emanated from the Exhibition of 1851.

Next, as to the prizes and the system of awards.

A difficulty arises in the consideration of this part of the subject, from the necessity of satisfying foreign as well as English exhibitors.

Our Society—having in view the various opinions which were expressed by persons who appeared equally capable of forming a sound judgment on the subject, and desiring that they should be recorded as soon as possible after the close of the Exhibition—issued a circular with questions, calculated to elicit information upon the working of the Juries and the distribution of Prizes, to which 114 replies were received.

Of these there were:—

	In favour of the Award of Prizes.	Against them.	Doubtful.
Exhibitors	20	22	5
Chairmen of Juries & Jurors	26	11	2
Neither Juror or Exhibitor	4	1	1
Foreign Commissioners ...	10	2	2
Colonial "	4	4	0
Total	64	40	10

But of the 64 favourable to prizes, several added strongly qualifying remarks to the effect, that they approved them if they could be given with perfect fairness and impartiality, and by juries intimately acquainted with the subject for which they were awarded. In 47 cases elaborate reasons have been assigned for the opinions given, of which 25 are for and 19 against prizes. There are 63 replies confined to the simple monosyllables, "Yes" and "No," of which 39 are for and 24 against them.

I will not venture an opinion upon the merits of the respective advocates for or against prizes, but simply state that I feel sure, when the question of prizes has again to be considered, it will be necessary, if it be determined to retain them, to revise with great care the rules under which the adjudications shall be made; and the cases now before the courts of law show how easily the public may be misled and injured by their means.

In stating the opinions of foreigners with reference to prizes, I ought to mention that Prince Napoleon, the President of the Exhibition of 1855, and of the French Commission issued in connexion with that of 1862, is decidedly opposed to them, and no one can have had better opportunities of forming a sound judgment upon this difficult subject, or be more fully informed upon the effect the absence of prizes would produce upon French exhibitors.

The next subject for consideration is the period which must elapse before another International Exhibition can be advantageously held in England.

This must be determined with reference to the object of such exhibitions; to the interests and wishes of foreign countries; to the interests of exhibitors, who expect to derive pecuniary advantages from exhibiting; and to the feelings of those who, having no personal interest to promote, contribute most materially by the loan of valuable works to their success, and without whose aid exhibitions would be deprived of their attractiveness to a large number of visitors; and also to the difficulty, which will increase with every succeeding exhibition, in finding room for the rapidly-increasing number of the products of industry.

Are we, then, to consider this question in its widest and most comprehensive aspect, as relating to an institution of the most cosmopolitan character, not originated for the benefit of individuals, though largely contributing to it, but in the interests of the world at large? Let us try and carry out the wise views of the Prince Consort, who described its object to be "to give a true test and a living picture of the point of development at which the

"whole of mankind had arrived, and a new starting point from which all nations will be able to direct their further exertions."

This cannot be attained unless there be considerable periods between the Exhibitions. If we expect foreigners to contribute, as they have hitherto done, to the magnificence and usefulness of our Exhibitions, we must be prepared, as we did in 1855, to take a proportionate interest in theirs, and this not only on the ground of the reciprocal interchange of civilities between nations, but on national and interested grounds, for we cannot afford to be absent from any great international gathering of the world's industry, be it held wherever it may.

We cannot reasonably expect that the possessors of valuable works of art, without whose aid Exhibitions would be comparatively uninteresting, will be willing to part with them at short intervals of time, or that the manufacturers of large and expensive machinery can be constantly incurring the inconvenience and expense of sending to distant places the magnificent examples heretofore exhibited, or that valuable collections of natural products, from all parts of the world, can be brought together but at considerable intervals of time.

Too frequent International Exhibitions must, I think, deprive them of much of their interest, lower them in quality and in national importance, reduce them to bazaars rather than collections of the world's art and industry, and divest them of that special and most interesting and instructive purpose for which they were originated, viz., to mark at intervals, for the information of statesmen and those engaged in arts, manufactures, and commerce, the direction and progress of human industry.

Now that Exhibitions have become acknowledged institutions held in the interest of the industry of the world, and now that their novelty has passed away, they can only be supported by one class on account of the commercial advantages they afford, and by others from the pride they feel in being able, by the loan of valuable works to contribute to the pleasure and instruction of millions of people, and to uphold the reputation and greatness of their country.

I arrive, then, at the conclusion, that so long as International Exhibitions are confined to England and France, each country could hold one with advantage about every ten years, but that, now other states desire to join in this peaceful mode of promoting the industry of the world, and to receive their full share of the benefits arising from the freest interchange of products and manufactures, the intervals between them in each country must be longer. No advantage that could result to us from holding them more frequently can be compared to that the world will derive from their being held in countries where the people are unacquainted with the benefits which an accurate knowledge of the products and manufactures of other nations confers upon all. It appears to me, that having in view our own prosperity as the largest manufacturers of the world, an International Exhibition held in a foreign country, where the products of our industries are comparatively unknown, is of greater importance than one held in this country, which can be seen by comparatively very few foreigners. The value of International Exhibitions does not depend on the frequency with which they may be held in one country, but upon their being held in various countries at reasonable intervals, so as to diffuse their advantages among the greatest number of the citizens of the world.

I hope that the views I have now had the honour to lay before the Society have convinced you that the International Exhibition of 1862 has most thoroughly fulfilled the duty assigned to it. I find that by the mark set in 1851 we can note accurately an industrial progress in England, in our Colonies, and in Europe of a magnitude before unknown in a similar period. So distinctly, indeed, is it marked, that it almost becomes a statistical fact in the history of the world's industry.

I find that this progress has taken place during ten

years, in which the industrial energies of this country been most severely taxed by foreign wars, by bad harvests, and by heavier public expenditure than has been borne for nearly half a century; and I find further, that these great discouragements have been almost entirely counterbalanced by the impetus given by the removal of nearly every legal impediment to the free action of our commerce with the world.

This has brought us such vast supplies of food and of raw materials in return for our exports (which have increased from 74½ millions sterling in 1851, to 124 millions in 1862) that misfortunes which in former times would well nigh have reduced our labouring population to want and misery, breeding social and political discontent, have scarcely been felt, and have placed us in 1863 in a position boldly to meet future difficulties, or, if they do not arrive, to move forward with still greater power and confidence than we have done during the eleven years which have just passed.

If, then, our industrious classes have gained so much by our recent commercial legislation, may we not inquire if there be any laws still in force which restrain the energies of inventors or restrict the free action of commercial pursuits?

Our reply must be that at home but few remain, while abroad there are still far too many; at home perhaps the most important, but respecting which considerable difference of opinion, I regret to say, still exists, is, in my opinion, our patent law, which is now receiving the attention of a Royal Commission.

I find, by the Jury Reports, that the most striking and characteristic feature of the Exhibition was a general improvement in the quality, and in the manipulative skill and taste employed in the production of most manufactures, whether English or Foreign, and not in the number or importance of new inventions.

The reporters on Paper, and on Iron and Steel, refer to the fact of the large number of patents taken out, and the poverty of the results accruing from them, and when we review the whole Exhibition, and compare it with 1851, and reflect that in the interval above 30,000 English patents have been taken out, independently of the registration of designs, and besides those taken out by foreigners in their respective countries, each patent securing to the patentee the monopoly of his fancied improvement for 14 years, we must, I think, be led to the conclusion, either that patentees have in most cases some other object in view in taking out a patent than securing themselves the advantages to be derived from a new invention, or that the patent law holds out to a speculative class the chances of winning a prize in a lottery too great for them to withstand, and therefore encourages a species of gambling in so-called inventions, by giving privileges to crude, ill-digested schemes, which, perfectly useless in themselves, are great incumbrances to the progress of real improvement.

I cannot express my opinion on the position the patent laws now so injuriously hold to industry more clearly than in the words which M. Chevalier applies to the patent laws of France:—"Patents," he says, "were born of a sentiment the object of which was the protection of the rights of intelligence. Patents are now injurious to industry, and experience shows they do not secure real advantages to inventors, or, if at all, very rarely. In the few instances of benefit derived from patents, the profits have gone to the hornets and not to the industrious bees."

But in foreign countries there is yet a great deal to be done before International Exhibitions can fully realise their glorious mission, and we must look with intense interest to the progress and gradual adoption of free-trade principles abroad. Judging by the effect of their application to our own trade and commerce in the last ten years, it is difficult to limit our expectations as to the vastness of the results which will follow their adoption by the great European Governments, and nothing will hasten it so much as holding International Exhibitions in countries where prohibitory and restrictive commercial laws are still

in force. When this time comes, and there are most encouraging signs that the public mind of Europe is steadily advancing towards it, we shall have to record industrial progress which will as far eclipse anything we have yet experienced, as the richness of their natural products, and the population and area of the other European States, exceed those of the United Kingdom.

But whilst we are thus looking to the Old World with hope, and to the seats of despotic Government for commercial freedom and progress, we cannot forget that discouraging blot which so lamentably disfigures the New World. That the country which, but a little more than two years back, prided itself on being all but the best governed, and its people the most universally educated and peaceable in the world, should so suddenly disregard the lessons of experience, lessens the confidence with which we otherwise should believe in the early accomplishment of universal free trade.

The recently free and educated America has dealt a heavier blow to the progress of commercial liberty than has been for a long time past inflicted by the combined action of despotic governments. They have advanced, though slowly, while America has retrograded rapidly. It is, however, as impossible to believe that the advantages of the freedom it has hitherto enjoyed will be forgotten, as it is to believe that the evils attending the operation of prohibitive and restrictive laws will not, when the temporary excitement of war has passed, make themselves as apparent and as oppressive and obnoxious in the New World as they have become in the Old.

Let us then hope that before the next ten years have passed, prohibitory and restrictive commercial laws will be abolished throughout Europe—that our inventive power may be relieved from the only load now pressing upon it, and that in the new world we may see, long before that time, a restoration of peace, and with it the reacknowledgment of those principles of freedom, personal and commercial, without which, no matter what the form of government, nations cannot be contented and prosperous; and, in conclusion, I have only to express my conviction, which I believe will be fully responded to in this room, that when the proper time arrives our Society, as in 1851 and 1862, will be fully alive to the discharge of its duties, and as efficient as it has hitherto been in its endeavours to promote International Exhibitions.

DISCUSSION.

The Marquis of SALISBURY said he rose to express the gratitude which must be universally felt by all present to the gentleman who had read the excellent paper they had just heard. He believed, according to the forms of this Society, there was generally some discussion upon the subject which had been brought before them, but anyone who looked at the wide and comprehensive nature of this paper, and the large number of topics it embraced, would feel with him that any discussion upon it must necessarily be very desultory; that no individual subject could be treated of in a manner which its importance deserved; and that, therefore, it would be much better to reserve for future consideration any particular details of the very excellent paper they had just heard. The object of that paper had been to show the great progress that had been made in industry and art since the Exhibition of 1851, and that that progress had been most satisfactory could not be doubted. In the recent Exhibition they had been favoured with the kind assistance of his Royal Highness, who occupied the chair at the opening ceremonial, and for this they were truly grateful. They only hoped that, on all future occasions, they would meet with the same support from his Royal Highness and the noble house to which he belonged, in the encouragement of all that tended to promote the arts, manufactures, and commerce of the country. There was every reason to be satisfied with the evidence that had been brought forward of the great progress this country had made, and there

was no doubt it had largely contributed to the improvement which had taken place over all the world. They were much indebted to the gentleman who had devoted so much time and attention to bring this subject before them in a condensed and at the same time very comprehensive form; and he thought he could not do better than propose that the thanks of this assembly be most cordially given to that gentleman for his labours. He would conclude by moving a vote of thanks to Mr. Hawes.

Lord Ebury said the deep interest he had taken in the Exhibitions of 1851 and 1862 made it a very great pleasure to him to second the motion of the noble Marquis. He could not but think that the Council of this Society were entitled to their thanks for having given the Society this opportunity of hearing so eloquent a paper upon the results of the late Exhibition. Events succeeded each other with such rapidity in this country, and in the world at large, that if we did not stop to note their effects upon society, the impressions produced were transient, and soon became effaced. It must be obvious to all that they had had this evening a most able conductor throughout the whole Exhibition, from one end to the other—a conductor who had taken them lightly over all the principal objects exhibited, but who had only been able to do this through the deep study he had evidently himself bestowed upon every department of that Exhibition. There had been some things stated which, perhaps, were not flattering to our national vanity, and this, he thought, showed that this paper had been drawn up, at least, with impartiality. Other statements must have been gratifying to us; and in treading upon that ground, which probably interested those present more than any other—he meant the ground of Art—Mr. Hawes had stated very clearly the various excellencies and deficiencies of the last Exhibition; but there was one country which he (Lord Ebury) thought had not been touched upon so prominently as it deserved—he referred to Denmark, with which we had recently been so auspiciously connected, and the works of which, in his opinion, were perhaps, for its size, the most remarkable of any that appeared in the art department of the Exhibition. He thought they could hardly overestimate the value of such a paper as that which had been brought before them this evening, while those matters were fresh in their minds. It was a document they could refer to on future occasions, and he thought the recommendations given, both with regard to the composition of the Commission, and with regard to the length of time which ought to elapse between one exhibition and another, must have recommended themselves to the good sense and reason of all who had had the advantage of hearing them. Under these circumstances he had sincere pleasure in seconding the motion which had been proposed by his noble friend.

Mr. MARSH NELSON said the speech by the noble lord who had just addressed the meeting showed how undesirable it was to deviate from the usual custom of discussing the papers brought before this Society. The noble lord had pointed out an omission in the able paper read by Mr. Hawes, and he (Mr. Nelson) would take the liberty of pointing to one or two matters which had not been referred to in that paper, with the view of doing as they had been invited to do by Mr. Hawes, namely, using the experience gained in the late Exhibition as a guide to any future undertaking of a similar kind. He (Mr. Nelson) could not but think that if the recommendations from time to time proposed by this Society to her Majesty's Commissioners had met with a little more attention, a great many of those faults which were patent, not only in this country, but throughout Europe, might have been obviated, more particularly, he believed, the financial results would have been different. On the last occasion, when they had the pleasure of discussing this subject under the presidency of Lord Granville, the noble lord admitted that a great deal of practical good resulted from that discussion. Having quoted the remarks of a writer in favour of exhibitions being arranged according to classes and not coun-

tries, Mr. Nelson went on to remark—that upon the proceedings of the meeting to which he alluded appearing in the French papers, Prince Napoleon said he was so satisfied that that was the proper mode of arrangement, that he was determined to adopt it in future exhibitions in France. What an opportunity the Commissioners of the late exhibition had lost in not being the first to adopt this system! Another suggestion was that in any future exhibition the greatest economy should be exercised as to the building. The contract for the first exhibition building was £79,800, and with the gratuity to Messrs. Fox and Henderson and extras, the cost was ultimately raised to £161,000. The extent of the first exhibition, as compared with the second, was about the same. The first contract entered into by the Commissioners of the late Exhibition was £300,000—nearly double the amount paid for the first building, including the gratuity to the contractors. If proper economy had been exercised, instead of a deficiency, made up by one of the contractors, there would have been a very large surplus. Another point for consideration was the result of the Exhibition with reference to this Society itself. This Society was the principal promoter of the Exhibitions of 1851 and 1862. By the agreement with the Commissioners, in consideration of those exertions, it was originally stipulated that if the building were retained permanently the Society was to have possession of a portion of the picture gallery. Shortly afterwards the Commissioners asked the Society to annul that agreement by the substitution of the words “provided the Exhibition succeeds,” for the words “if the building is permanently retained.” The result was, that although the building was intended to be retained, and although Parliament was about to be called upon to vote a sum of money from the public funds for the purchase of it, the Society of Arts was to receive no advantage. He must say he thought in this respect that Mr. Cole had been rather negligent of the interests of the Society; and he thought, moreover, the Society was fairly entitled to that portion of the building which had been originally conceded to it. Another question to discuss was the results of the Exhibition to the public. Those results were shown in the paper just issued by Parliament, from which it appeared the country would be called upon to vote nearly half a million of money for the purpose of retaining that hideous building. The gentleman who had read the paper had but very slightly alluded to the subject of the building. He knew what the feeling was in this room this time last year when it was discussed, and it was he who rose in his place as a member of the Council to ask Lord Granville to omit that question from the discussion, but Lord Granville very properly said, “If you talk about the Exhibition, everything which pertains to it, within and without, is matter for discussion,” and he could not help thinking that the ingenious advice of the two noble lords who had addressed them this evening, not to enter into a discussion upon the paper, was in order to prevent, as far as possible, that knotty and somewhat disagreeable point being entered upon on this occasion. It was somewhat *apropos* that the subject should have been brought forward a few days before the purchase of the building would have to be considered in Parliament, and he could not believe that Parliament would sanction such a lavish expenditure of the public funds. Let them look at the results. The first Exhibition building cost £161,000. That was a building universally admired, and one which was more or less copied by every country who had an exhibition subsequent to that of 1851; but notwithstanding the advice of this Society, that that should be the prototype of the building of 1862, a building was erected for which Parliament was now asked to give £80,000, and to spend £284,000 in altering or completing it, nearly double the first cost of the Exhibition of 1851, and £128,000 more than the cost of the Crystal Palace, including the purchase of the Hyde-park building. The total cost of the Crystal Palace was £235,000, and yet the country was asked to expend £284,000 in altering this monstrous building. If

the alteration were such as to make it a building worthy of the country, he would be the last to oppose it; but on every principle of design, plan, and architectural effect, that building had been universally condemned. In the first place, the building was below the level of the streets; some dozen steps had to be descended to reach the main portions of the structure, and they could never raise it up, and if any one took the pains to examine the beautiful drawings in the Royal Academy this year, and compared them with the building itself, they would find that there was not a chance of their being carried into effect, as they differed so materially from the structure now standing at Kensington; and he believed the end of this business would be, that a report would be made that it was impossible to alter the present building, that it would be better to sweep it away and go to Parliament for another grant. The Chancellor of the Exchequer explained, so far as he was able to do so, what this £284,000 was for. He was asked whether it was for the purpose of carrying out any new design, when he replied that that estimate was merely that the building might assume a decent appearance. Could anything be more insulting to the common sense and taste of the country? If the present site was a desirable one let it be purchased, but sweep away the building and begin *de novo*. The building had been declared to be unfitted for the objects for which it was erected, not only by architects of great experience, but by the public. It bore no comparison to the Crystal Palace, and yet it was to be made a fixture and a permanent disgrace to the country. He thought, as far as the results to the public were concerned, if this building were to be perpetuated it would be a lamentable thing for the country.

Mr. HENRY COLE said Mr. Nelson had thought proper to introduce his (Mr. Cole's) name into this discussion, and if that personal allusion had not been made he would have left Mr. Nelson's statements to speak for themselves, but he challenged that gentleman to produce any authority whatever for the statement that he (Mr. Cole) had been any party to the negotiations for the sale of the building to the government. On his honour he stated he had had nothing whatever to do with it. He had not even been consulted upon the matter by any member of the government, and he had had nothing whatever to do with any negotiations between the government and the contractors for the building; and he declared that every syllable Mr. Nelson had uttered on that subject was positively untrue. He could go through many of the other statements, and show that they were equally untrue. To refer to one instance alone—as to the extent of the building of 1851 being equal to that of the building of 1862—the difference was as between 18 acres and 26 acres of ground; that was a fact which Mr. Nelson could determine for himself. He had no intention of following Mr. Nelson throughout his statements, and would not have risen except in his own justification.

Mr. NEWTON WILSON, while agreeing with the views of the noble lords who had suggested the inadvisability of entering upon the discussion of so comprehensive a paper this evening, expressed a hope that the Council would afford a future opportunity of considering many points of great importance which had been introduced in the paper, and which he considered were proper subjects for full and deliberate discussion by the members of this Society.

Mr. J. H. MURCHISON remarked that the temper and tone displayed by certain members of the Council did not tend to prevent the display of unpleasant feelings whenever the subject of the Exhibition building was brought before the Society. He thought a great deal, if not the chief cause, of the difference of opinion that existed with regard to the merits of the building had been occasioned by the manner in which the selection of it had been made. One great object of this Society was to promote art, and a more splendid opportunity of bringing forward the architectural ability of the country never occurred than would have been af-

forded by inviting designs and plans for the building for the late International Exhibition. But the public heard nothing of the building till it was selected and contracted for, and it was certainly an important omission from the paper that it had not shown that in future exhibitions it would be desirable that a different mode of selecting the building should be adopted. He would not occupy the time of the meeting longer on this occasion, because he believed it was the intention of the Council to afford an opportunity at a future time for discussing this subject in the most unreserved manner. He regretted that it should have been brought forward at the end of the session rather than at the commencement, when the whole subject might have been fully considered and discussed in a manner which its importance deserved.

Mr. MARSH NELSON stated, in explanation, that the superficial area of the building of 1862 was 720,000 feet, and that of the building of 1851, 786,200 feet. He was comparing the 1851 building with that of 1862 as it would be sold to the country. The only difference was in the eastern and western annexes to the present building.

His Royal Highness the Duke of CAMBRIDGE then rose, and said his remarks would be very brief, as he felt himself in a somewhat difficult position. It was true that he had had the honour of taking part in the opening of the Great Exhibition of 1862, but that was a circumstance which did not in the slightest degree originate from any personal qualifications he possessed to undertake that duty, for he had no intimate acquaintance with subjects of this kind. As a soldier, he had naturally principally devoted himself to military affairs, and that circumstance alone very materially disqualified him from giving a correct opinion upon the subjects treated of in the paper. He had alluded to the fact that he had been placed in a somewhat peculiar position in connection with the late Exhibition, from a circumstance which had been adverted to by the gentleman who had given them so able and eloquent a description of the results of that exhibition. That circumstance was a loss which no Society could feel more deeply or more continuously than the Society he had now the honour to address. It was a loss which had been experienced by this great and powerful nation. It was a loss which had been felt from the highest dwelling to the humblest cottage. It was a loss which had been felt in our distant colonies. It was a loss which was felt by none more than by those connected with the arts and sciences of this country; for he was quite sure that to that great and illustrious Prince was due much of the progress that had been made. It might with justice be said, that since the time when he assumed the high and prominent position he so nobly filled during his lifetime in this country, a new impulse was given to the arts and sciences here. Now, in no respect was this more felt than with reference to the Exhibitions of 1851 and 1862, for if it had not been for the Prince Consort, he thought it probable that the Exhibition of 1851 would never have taken place. Personally, it was true that his Royal Highness took no immediate part in the Exhibition of 1862, but it was well known that his invaluable advice was in the early stage of that undertaking anxiously sought for by those who managed the Exhibition. Though not ostensibly connected with that Exhibition as he was in 1851, still his spirit had pervaded it, and therefore he (the Duke of Cambridge) felt justified in again paying that testimony of respect to his memory, which could never be offered more appropriately than at a meeting of this Society, over which he had so ably presided. He must confess he thought the suggestion of his noble friend the Marquis of Salisbury, in moving the resolution, was wise and judicious, viz., that so many important and interesting subjects had been alluded to in the able paper they had heard from Mr. Hawes, that there was hardly time or opportunity to discuss them satisfactorily on this occasion, and any discussion must necessarily be of a very desultory character. He could not but think that what they had just experienced proved the noble marquis to have been right; because, although it

was perfectly true that it was competent for any gentleman who had any observations to make to address this meeting, yet he did not see that the observations which had been made could lead to any useful results, for they were merely a display of personal feeling, which he thought, although it might exist, ought not to have been brought forward on this occasion. Whether the building was a good building or a bad building, he was sure they did not expect him to offer an opinion, and he thought that Parliament was a more fitting place for the discussion of such a subject. To return to the observations of the gentleman who had so ably brought the whole question of the Exhibition before their notice, he (the Chairman) could never regard that Exhibition except as one of the greatest importance, at the same time he thought the suggestion that those exhibitions should not be too frequent was deserving of the highest consideration. If these international meetings occurred at prolonged and stated periods—say of ten years—probably that might be the best period of interval—there was always time for reflection, time for new inventions, and for making use of the experience gained on the former occasion. It was right that time should be given for new developments of industry, and for the results of any improvements in commercial legislation. They could not say that the system of free-trade had been yet fully developed, although it had been established for a considerable number of years. Then, again, there was the great commercial treaty with France. They would not say that all the advantages of that treaty had been yet brought out. It was necessary in undertaking these International Exhibitions that a certain period of time should elapse for the world to settle down to those great and inevitable changes which were constantly going on. Then, again, if they looked to the objects of those gatherings, they ought not to be made too common, so as to lessen the interest, for if the interest were lessened the good done was in a great degree lost. He had heard, with pleasure, the observations which fell from Mr. Hawes with reference to our colonial possessions. If there was one department which, as an Englishman, gave him more satisfaction than another, it was the admirable collection of productions from our various colonies. The colonies were thus shown in their different stages of development, some that were backward in bringing out the advantages they possessed, and others far advanced, and rapidly coming into competition with ourselves. He thought it was a great and glorious thing for England to think she had these colonies, which looked up to the mother country with satisfaction and pleasure, and were gradually preparing themselves for a position which he hoped they would one day attain, independence. But it was in his opinion most undesirable to hasten this; on the contrary, he thought it was desirable, both for the mother country and the colonies themselves, that they should obtain their independence as gradually as possible. Of late years it had become rather the fashion to treat our colonies with very little consideration, and to speak merely of the expense they were to the mother country, without looking at the advantages they conferred. He was persuaded it would be a great error if that view were general, but he did not believe that was the opinion of the people of England. He believed there was a class of people imbued with it, but he thought the generality of Englishmen entirely disapproved of the idea of suddenly, rapidly, and he might say almost unreservedly getting rid of our colonies; and, therefore, what they saw in the Exhibition of 1862 ought to make them desire by every means in their power to foster and support those colonies by good legislation and by kind support. He thought the immediate subjects connected with exhibitions had been so exhausted by the paper read, that there was nothing remaining for him to add to what had fallen from Mr. Hawes; and in concluding the few observations he had ventured to make, he would only express to the meeting his regret that on this occasion they should

have had the disadvantage of being presided over by one who, at the outset, explained how difficult was his position, but who had endeavoured, in the circumstances in which he was placed, to discharge that duty to the best of his ability. His Royal Highness concluded by putting the resolution that the thanks of the meeting be given to Mr. Hawes for his able and valuable paper.

The vote of thanks having been passed,

Mr. Hawes, in acknowledging the compliment, expressed his thanks for the reception that had been given to his paper, and said that he had not disguised, at the commencement of his remarks, that he intended to treat the results of the Exhibition in their commercial, artistic, and manufacturing aspects. He had carefully endeavoured to avoid introducing any topic which he thought might create difference of opinion in the meeting, and had only wished to lay before them a few results, entirely without reference to private feelings which some persons might entertain with regard to the building itself. He had not thought that a subject for discussion by the Society at the present moment, and he was glad to find the view he had taken so ably supported by his Royal Highness in the chair. He thanked them for listening to him for the third time on this subject. He had almost feared it had been exhausted, but he was happy to find that exhibitions were still as popular as ever, and only required to be directed with care and judgment to insure success.

The Secretary announced that the Annual General Meeting would be held (in accordance with the Bye-Laws) on Wednesday, the 24th inst., at 4 p.m.

THE ASSOCIATION FOR THE PREVENTION OF STEAM BOILER EXPLOSIONS, MANCHESTER.

At the ordinary monthly meeting of the Executive Committee of this Association, held at Manchester, March 31st, William Fairbairn, Esq., C.E., F.R.S., President, in the chair, Mr. L. E. Fletcher, chief engineer, presented his Monthly Report, of which the following is an abstract:—

During the past month, there have been examined 370 engines—1 specially; 492 boilers—6 specially, 17 internally, 60 thoroughly, and 409 externally, in which the following defects have been found:—Fracture, 2 (1 dangerous); corrosion, 18 (2 dangerous); safety valves out of order, 4; water gauges ditto, 24 (1 dangerous); pressure gauges ditto, 16; feed apparatus ditto, 5; blow-off cocks ditto, 47 (1 dangerous); fusible plugs ditto, 5; furnaces out of shape, 3 (1 dangerous); over-pressure, 2; deficiency of water, 2; blistered plates, 2. Total, 130 (6 dangerous). Boilers without glass water gauges, 1; without pressure gauges, 1; without blow-off cocks, 36; without back pressure valves, 58.

EXPLOSIONS.

It will be remembered that in last month's report no detailed particulars were given of No. 1 explosion, which occurred to a boiler not under the inspection of this Association, and which was of the double furnace, internally fired class. Particulars have, however, been since obtained, and show that the explosion was of a very simple character. It was the practice to keep up a fire in this boiler throughout the night, for the purpose of heating the mill, and a boy was left in charge to attend to it. The demand made upon the boiler for steam was such that no supply of water would carry it through the night, and therefore it was the duty of the attendant to make up the deficiency with the donkey pump. This, however, he neglected to do, in consequence of which the furnace crowns were laid bare, the plates became red-hot, and collapse ensued. The boy was absent from the boiler at the time of the explosion, neither was any one else near it, and thus happily no lives were lost nor any one injured, while the damage to property was confined to that done to the boiler itself.

This is just one of those cases in which a low-water safety-valve would have been of service, not only by its giving an alarm before the furnace crowns were laid bare, but also by letting off the pressure of steam.

Two explosions have occurred during the past month to boilers not under the inspection of this Association, by which 15 persons were killed, and 16 others injured, making a total of 31. Both boilers have been personally examined subsequent to the explosion. The following is the monthly tabular statement:—

Index No.	Date.	GENERAL DESCRIPTION OF BOILER.	Persons killed.	Persons injured.	Total.
No. 4.	Feb. 23.	Vertical Iron Works Boiler. Internally fired.....	13	15	28
No. 5.	March 17.	Ordinary double flue, or "Lancashire," Internally fired.	2	1	3
Total.....			15	16	31

No. 4 explosion occurred at an iron works, to a boiler connected to a series of eighteen others. It was very similar in general construction, though not precisely so, to those known as upright furnace boilers, like which, it stood erect, was of considerable height, and surrounded with brickwork. They, however, are heated by the flames passing off from the iron furnaces, which play first upon the outside of the shell, then pass through openings in the side into an internal descending flue, and escape to the chimney; while the boiler in question had its own independent furnace, placed in the internal flue, which was thus converted from a descending to an ascending one, the openings at the side becoming outlets for the flame instead of inlets. The top of the boiler was hemispherical, and the bottom flat; whereas in the ordinary furnace class, both ends are hemispherical, which is an important difference.

The boiler was 20 feet high, and about 9 feet 6 inches diameter. The internal fire box was 10 feet high, 4 feet 6 inches diameter at the crown, and also for about the first 3 feet 6 inches below; from which point it tapered outwards to a diameter, at the bottom, of 6 feet 6 inches, leaving an annular water space all round, about 18 inches in width, between it and the shell. This fire box was united to the shell at the bottom, by a flat plate connected by rings of angle iron inside the water space. The crown of this internal fire box was slightly domed, and flanged at its attachment to the cylindrical slides, being amply stiffened by six angle irons laid across and well riveted to it. At the upper part of the fire box, were the two outlets previously referred to, and which were formed by short transverse flues passing through the water space, and thus establishing a communication between the internal furnace and the external flue. These short flues, which were opposite one to the other, and at right angles to the furnace door, were 2 feet 6 inches in diameter, and attached by rings of angle iron at each end.

The thickness of the plates was: in the hemispherical end and cylindrical sides of the external shell, three-eighths of an inch; in the flat plate at the bottom of the water space, seven-sixteenths; while all the angle irons were 3 inches by 3 inches and half an inch thick. In the fire box the thickness of the crown plate was half an inch, and that of the sides seven-sixteenths.

With regard to the lay of the plates, that in the shell was according to the usual plan, being radial in the hemispherical end, and circumferential in the cylindrical sides, the seams in the latter breaking joint; while in the taper portion of the fire box, the plates were laid longitudinally, and thus, which it is important to notice, the seams were in line for a length of between six and seven feet. The

riveting was single throughout, and the seams were the ordinary overlap.

The boiler had been fitted with a float, two gauge taps, one feed stop valve, one feed back-pressure valve, and one lever-safety valve of 5 inches diameter, which was loaded to a pressure of nearly 50lbs., and at all events would have allowed the steam to have reached that pressure when blowing off freely. Also there were two junction valves, one of which was in the steam-pipe communicating with the entire series of boiler, and the other in that connected to the steam hammer. There was no steam pressure-gauge on the boiler itself, but one was fixed to the main steam pipe beyond the junction valve, and thus afforded no indication of the pressure of the steam within the boiler, when it was shut off from the others in the series. Both of the junction valves were closed at the time of the explosion, and thus the safety-valve formed the only outlet for the steam. What the pressure then rose to cannot now be ascertained, the steam pressure gauge, as just pointed out, giving no indication under such circumstances. The safety-valve, however, was found to be free after the explosion, and there is no reason to conclude that it had been otherwise previously. But it is apparent from this how circumstances will arise which make it important that every boiler should be fitted with a duplicate safety-valve, as well as with its own independent pressure-gauge.

A very general impression exists that the cause of most, if not of all the explosions that occur at iron works, is to be found in the old age and dilapidated condition of the boilers; such, however, was not the case in this instance; the workmanship of the boiler was satisfactory throughout, and its condition good. It was reported to have been at work only a few months, which its appearance corroborated. Were all boilers in as good a condition as this one was, explosions would be of much rarer occurrence than at present.

The cause of this explosion was not "shortness of water;" the crown of the fire box was uninjured, the colour of the plate black, a thin scale covering portions of it, while the rents made in the boiler were not those which a deficiency of water would have occasioned.

A serious oversight had been made in the design of the boiler, the top end being hemispherical and the bottom flat. The hemispherical end would, when the steam was fully up, and blowing off freely, have an upward pressure nearly of 250 tons acting upon it and tending to tear it away from the bottom. There would be an equal downward strain counteracting this, induced by the pressure of the steam upon the crown and tapering sides of the fire-box, combined with that upon the flat plate forming the bottom of the annular water space. As long as the attachment between the bottom and the top of the boiler held good, the two forces would be in equilibrio, and the boiler remain at rest upon its bed. But should the attachment fail, the upward force would instantly shoot the top of the boiler up into the air with a buoyancy of 250 tons, which it may be remarked, is equal to the weight of a long railway train, including the engine and tender fully equipped with coal and water. This action is exactly what took place. The flat plate at the bottom gave way, rending completely round through the seam of rivets, at the outside ring of angle iron which attached it to the shell; when the boiler flew up and was carried to a distance of 160 yards from its original seat. The brick-work at the top of the chimney was shaken, and there were marks of violence on the crown of the boiler, so that it is possible that it struck the top of the chimney in its course. There is nothing surprising in this, when the amount of the pent-up force of steam within so large a boiler is considered, and the due appreciation of which shows how unnecessary is the supposition of the existence of explosive gaseous compounds, or any force greater than that of the steam itself; while the propagation of such theories only tends to divert attention from the real cause of steam boiler explosions. The rent at the flat bottom

plate however was by no means the only one that was made. The short transverse flues passing through the water space, and which considerably assisted the bottom plate, also gave way, and were torn from both the shell and fire box, their mode of fracture giving unmistakable evidence of the upward flight of the shell. The resistance of these flues to fracture, had severed the fire-box in the waist at the ring seam of rivets, at which the longitudinal plating terminated; and thus the fire box crown, as well as one ring of plates with the two short flue tubes, had flown up together with the shell, which made a somewhat remarkable and complicated feature in the development of the rents. Added to this, the remaining portion of the fire box, which was taper, and placed longitudinally, rent at one of the longitudinal seams opposite the fire door, and collapsed at that part.

Some difference of opinion has existed amongst the engineers who have examined the boiler, as to whether the explosion originated at the rent of the flat bottom plate, or at the collapse of the fire-box. Though there may be some difficulty in determining which was the weaker spot of the two, there has been none in deciding that the boiler was inherently defective; and the opinion has been unanimous that there is no evidence for attributing the explosion either to "shortness of water" or excessive pressure, but that it was clearly owing to the malconstruction of the boiler itself. It may be added that the application of the hydraulic test would have detected and exposed the weakness both of the fire-box and bottom flat plate, the former, by its temporary flattening, the latter by the movement and rising of the outer shell.

The jury at the coroner's inquest came to the following conclusions, which are quite in accordance with the preceding report:—"That the explosion was caused by the bad construction of the boiler; that every boiler ought to be supplied with a steam pressure-gauge; and that no new boiler ought to be put to work before it has been examined by some competent engineer and pronounced to be safe."

No. 5 Explosion, occurred to one of two mill boilers working side by side and connected together, both being of the plain double-flued, internally-fired class, termed "Lancashire."

The length of the one in question was 28 feet, the diameter of the shell 10 feet, and that of the flues, which were parallel throughout their whole length, 3 feet 9 inches; the thickness of the plates was seven-sixteenths in the shell, and three-eighths in the flues. The boiler had been fitted with one glass water-gauge, one feed back-pressure and stop-valve combined, one blow-out tap, one lever safety-valve, and one Schaeffer steam pressure-gauge, common to both boilers. The pressure at which the safety-valve was stated by the engine attendant to have blown off, was 30lbs. on the square inch, which an examination of its dimensions, lever and weights corroborated.

On examining the boiler it was found that the right-hand flue had collapsed from one end to the other, and by the flattening action had become severed completely in two at some of the ring seams of rivets, as well as torn away from the end plate at the back of the boiler. The boiler had not stirred from its original position, and the connections to the one alongside remained unbroken.

The rush of water, however, from the opening at the back, had blown up the brick flue and carried away the end wall of the boiler-house, in consequence of which a floor above, as well as some cast-iron girders by which it had been supported, were brought down. It was by the fall of the building that the three men received their injuries, one of whom was found to be dead when dug out of the debris. At the front end of the boiler the furnace mountings had been blown off.

The amount of damage done to the surrounding property was comparatively inconsiderable, and this is generally found to be the case where explosion is confined to collapse of the internal flues. Where, however, the ex-

ternal shell gives way, the consequences are much more serious. The boiler does not then remain quietly in its seat as it did in the present instance, but—to the effect of the percussive action of the steam, which was the only element of injury in this case—adds that of the flight of the fragments of the shell, as in the preceding No. 4 explosion, as well as in the one that occurred to an ironworks boiler in December last, the particulars of which were given in the report for that month.

With regard to the cause of the collapse, there was no evidence of "shortness of water," judging from the appearance of the plates; added to which, the other furnace in the same boiler remained unaltered in shape, which could not have been the case had deficiency of water occurred: while, in addition, it appeared that the collapse of the flue had commenced at the middle of its length, and not over the furnace, where the shape was less distorted than at any other part.

The collapse cannot be fairly attributed to "shortness of water," but its true cause will be found in the construction of the flue, which was not strengthened with flanged seams or the addition of any hoops. Such a flue as the present, of so large a diameter as 3 feet 9 inches, and 28 feet long, made of plate only three-eighths thick, is not safe for regular work with steam at a pressure of 30 lbs. per square inch, as was the case in this instance. It might work for a time, but still there would be a risk, as the event proves; a risk that might have been avoided had the flue been strengthened with any of the approved methods, namely, flanged seams, or hoops, either of angle iron, T iron, bridge rail section, or any other suitable form; to the importance of which attention has been called, it is feared with tedious frequency, though an apology for so doing, it is thought, may be found in the repeated occurrence of such explosions as the present, and in the loss of life consequent upon them.

It may be here added, there is every reason to conclude that the boiler in question was an illustration of the danger referred to in previous reports, arising from internal flues being actually oval, although supposed to be circular. The angle iron rings at the end plates were circular, but the inclination of the axis of the collapse of the flue indicated that the middle portion had been oval. The other flue alongside was evidently so, and had, in consequence, been strengthened by two stays attached to the crown. The flues of all the boilers under inspection of the Association are gauged to ascertain their actual shape, when the members allow an opportunity of making "thorough examinations," without which it cannot be done; and very numerous are the instances in which flues, previously supposed to be circular, are found on actual measurement to be oval.

This explosion is one that must be added to the category of those caused by mal-construction of the boiler, and cannot be termed accidental. The application of the hydraulic test would have detected the weakness, and the adoption of any of the approved methods of strengthening flues mentioned above, prevented the explosion. These preventives have now become common knowledge, they can be applied at little expense, and by any ordinarily competent boiler maker, and thus are within the reach of all. It may therefore be fairly pointed out that their rejection by one manufacturer is an act of injustice to others, since nothing can operate more directly to induce government interference with the present unfettered use of steam, than the frequent occurrence of loss of life through the neglect of precautions so simple as those just alluded to.

Home Correspondence.

CARBURATION OF GAS.

SIR.—In the discussion on Mr. Paul's paper, Mr. Scott says that Mr. C. Mansfield was "the first person to propose what was now called the carburation of gas, to in-

crease its illuminating qualities." It will be found that Low patented the process in 1841, and alluded to it in a general way in a previous patent of 1832, the claim in which is so comprehensive that, if valid, it would render doubtful all subsequent patents. The process has been patented more than twenty times since, and yet a Joint Stock Company is just now in the market proposing to purchase the patent rights (?) of a Frenchman for the sum of £50,000. I am, &c.,

W. SYMONS.

17, St. Mark's-crescent, Regent's-park,
June 3rd, 1863.

MEETINGS FOR THE ENSUING WEEK.

- MON. ...R. Geographical, 8½.
TUES. ...Medical and Chirurgical, 8½.
Zoological, 9.
Syro-Egyptian, 7½. Mr. Sharpe, "On the various dates of the several parts of the Pentateuch."
Anthropological, 7. Mr. R. S. Charnock, "Science of Language."
Royal Inst., 3. Prof. Tyndall, "On Sound."
WED. ...Microscopical, 8.
R. Literary Fund, 3.
R. Soc. Literature, 8½.
Archæological Assoc., 8½. 1. "On Leadens Objects found in London by the late C. Ainslie, Esq." 2. Mr. Cuming, "On Seals of the Bishops of Man." 3. Mr. T. Wright, "On the Jewry Wall, Leicester." 4. Mr. Moore, "On further Roman Discoveries at West Coker, Somerset."
Royal Horticultural. Uncovering of Memorial of Exhibition of 1851.
THURS. ...Royal, 8½.
Antiquaries, 8½.
Philosophical Club, 6.
Royal Inst., 3. Prof. Ansted, "On Geology."
FRI. ...Astronomical, 8.
Royal Inst., 8. Prof. Tyndall, "An Account of some Researches on Radiant Heat."
SAT. ...Royal Botanic, 3½.
Royal Inst., 3. Professor William Thomson, "On Electric Telegraphy."

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[From Gazette, May 29th, 1863.]

- Dated 2nd April, 1863.
845. W. H. Phillips, Nunhead, Surrey—Imp. in means or apparatus for cleaning the bottoms of ships or other floating vessels.
Dated 20th April, 1863.
981. C. Blanc, 8, Rue Chapen, Paris—Imp. in apparatus for the purpose of using air and steam as motive power.
983. W. E. Newton, 66, Chancery-lane—Imp. in lamps. (A com.)
Dated 22nd April, 1863.
1005. J. Lee and E. Dawson, Tammerfors, Finland—Imp. in looms for weaving.
Dated 24th April, 1863.
1021. P. Passavant, Bradford—Imp. in the manufacture of blue colouring matter, and also of violet colouring matter. (A com.)
Dated 25th April, 1863.
1035. L. A. J. Bruet, Paris—Imp. in apparatus for registering, indicating, and verifying the time and distance passed over by vehicles, also applicable to machinery and other similar purposes.
Dated 27th April, 1863.
1057. A. Rollason, East Peckham, Surrey—Imp. in dyeing and staining fabrics, parts of which imp. are also applicable for dyeing, staining, and ornamenting glass and other substances.
Dated 5th May, 1863.
1121. F. Applegate, Bradford-on-Avon, Wiltshire—Imp. in stopping and starting railway trains.
Dated 6th May, 1863.
1137. A. V. Newton, 66, Chancery-lane—Imp. in sewing machines. (A com.)
Dated 7th May, 1863.
1139. J. Snider, jun., Dorset-street—Imp. in breech-loading fire-arms and ordnance.
1141. J. Walker, Compstall-bridge, near Stockport—Imp. in the construction of mechanism applicable to looms, and partly to carding engines and other machinery.
1145. J. Bettridge, Birmingham—Imp. in the ornamentation of papier mache and other japanned wares, wood, ivory, and other similar materials.

1147. J. B. P. A. Thierry, 91, Rue des Marais, St. Martin, Paris—Imp. in the arrangement or construction of furnaces to render the combustion of fuel more complete, and to prevent the emission of smoke therefrom.

Dated 8th May, 1863.

1149. P. J. Livsey, Manchester—Imp. in compound steam engines. (A com.)
 1153. C. L. Braithwaite and J. Hirst, Westmorland—Imp. in machinery for feeding slivers of wool and other material to carding engines.
 1155. J. C. Droop, Schwelm, Prussia—An instrument or holder for holding nails, screws, or other fastenings.
 1159. G. T. Bousfield, Loughborough-park, Brixton—Imp. in steam engines. (A com.)

Dated 9th May, 1863.

1160. W. Thomson, Coatbridge, Glasgow—Imp. in obtaining motive power, which imp. are applicable in part for raising or forcing fluids into steam boilers, tanks, and other vessels.
 1161. J. Strickland, 25½, Gee street, St. Luke s—Imp. in laying veneers on to surfaces, in applying the glue for that purpose, and in the apparatus employed.
 1165. J. Page and A. T. Wayne, Birmingham—An imp. or imps. in the manufacture of pens.
 1166. J. Briery, Denby Dale, near Huddersfield—Imp. in dyeing knickerbocker yarns and textile fabrics manufactured of or from such yarns.
 1167. W. Boaler, 85, Piccadilly, Manchester—An improved dryer fabric for paper making.
 1171. J. B. Wood, M.D., Vernon house, Camp-street, Broughton, near Manchester—Imp. applicable to the defending of ships or vessels and forts when armour plating is employed.
 1173. C. H. G. Williams, Burnford-street, Glasgow—Imp. in the manufacture of colouring matters.

Dated 11th May, 1863.

1177. B. Hargreaves, Arden-house, near Accrington, Lancashire—Imp. in tiles for drainage or sanitary purposes.
 1179. C. Shorrocks and W. Shorrocks, Over Darwen, Lancashire—Certain imp. in power looms for weaving.
 1183. R. A. Brooman, 166, Fleet-street—Imp. in coupling and disconnecting carriages on railways, and in machinery employed therein. (A com.)
 1184. J. S. Guirette, Paris—An imp. in inhaling apparatuses.
 1186. J. E. McConnell, Dean's yard, Westminster, and G. H. Bovill, Durnsford-lodge, near Wandsworth, Surrey—Imp. in chain, for cables and other purposes.

Dated 12th May, 1863.

1187. B. Lilley, Birmingham—Imp. in the construction of "snap caps" or "nipple protectors" for fire arms.
 1189. T. Warren, Glasgow—Imp. in glass and other furnaces or kilns.
 1191. J. E. McConnell, Dean's yard, Westminster, and C. H. Bovill, Durnsford-lodge, near Wandsworth, Surrey—Imp. in treating worn out railway tyres.
 1193. G. A. Huddart, Brynkir, Carnarvonshire—Improved apparatus for cutting slate.
 1195. R. A. Brooman, 166, Fleet-street—Imp. in spring mattresses. (A com.)

Dated 13th May, 1863.

1199. R. A. Brooman, 166, Fleet street—Imp. in laying submarine telegraph cables. (A com.)
 1201. T. Parkinson and F. Taylor, Blackburn—Imp. in machinery for weaving, sizing, dressing, and dyeing.
 1203. J. E. McConnell, Dean's yard, Westminster, and G. H. Bovill, Durnsford-lodge, near Wandsworth, Surrey—Imp. in the manufacture of thick plates of wrought iron for armour plates and other purposes.
 1205. C. L. Kensner, East Greenwich, Kent—Imp. in the manufacture of hydrate of barytes, and in the manufacture of sugar.
 1207. A. G. Southby, Bulford, Wiltshire—Imp. in railway roof lamps, station, signal, and other fountain lamps.
 1208. J. Farmer, Salford—Imp. in calendering, embossing, and other such machines used for finishing woven fabrics, part of which imp. is also applicable to drying machines.
 1209. R. A. Brooman, 166, Fleet-street—Imp. in the extraction of hydro-carburets from minerals, in the distillation thereof, and in the apparatus employed therein. (A com.)

Dated 14th May, 1863.

1211. J. Satchwell, W. H. Ashford, and C. Harrison, Birmingham—Imp. in nails or rivets for boots and shoes, applicable to other purposes.
 1213. J. T. King, Liverpool—Imp. in wicks for oil and other fluid burning lamps. (A com.)
 1215. G. Dowler, Birmingham—An imp. or imps. in match boxes.
 1217. F. K. Erlam, Devonshire-terrace, Fulham-road—A new lubricating material or compound.
 1219. I. Parker, Houghton-street, Clare Market—Imp. in connecting and securing door and other knobs or handles to their spindles.

Dated 15th May, 1863.

1220. B. Shillito and D. Moor, 51, High-street, Kingston-upon-Hull—Imp. in generating heat and motive power.
 1221. D. M. Fyfe, Maidenhead, Berkshire—Imp. in the brushes, instruments, or apparatus employed for painting the centres and bulls-eyes of military or other targets.
 1222. D. M. Fyfe, Maidenhead—Imp. in the means or apparatus employed for raising, removing, transporting, and refixing military or other targets or mantlets.

1223. W. Clark, 53, Chancery-lane—Imp. in repeating fire-arms. (A com.)

1224. A. Macmillan, 17, King's-road, Ball's-pond-road, Islington—Imp. in buttons and in fastening buttons to garments.
 1227. J. Papin, C. Lintz, and L. Lavacherie, Paris, Rue Feydeau, No. 28—Imp. in the manufacture of boots and shoes.

- INVENTION WITH COMPLETE SPECIFICATION FILED.
 1282. W. Snell, 16, Clement's-inn, Westminster—Imp. in butt hinges. (A com.)—22nd May, 1863.

PATENTS SEALED.

[From Gazette, May 29th, 1863.]

May 27th.

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| 3191. J. Cresswell & E. T. Greves. | 3287. G. A. Huddart. |
| 3192. S. J. Browning. | 3306. J. Lamb. |
| 3194. W. Buller & J. H. Mugford. | 3312. A. P. Price. |
| 3196. J. Adams and W. C. White. | 3315. W. Clark. |
| 3197. A. Dudgeon. | 3319. W. Tristram & H. Brereton. |
| 3200. F. G. Taylor. | 3321. R. A. Ronald. |
| 3206. J. C. Robertson and W. C. White. | 3344. M. Henry. |
| 3211. M. Henry. | 3349. W. Phelps. |
| 3212. H. L. Emery. | 3384. J. Clayton. |
| 3214. G. F. Griffin. | 3401. J. Dalton. |
| 3215. T. Waller. | 3432. G. H. Birkbeck. |
| 3217. R. Flude. | 84. M. Henry. |
| 3219. J. Romer. | 110. C. E. Amos. |
| 3230. G. F. Blumberg. | 417. W. C. McEntee, G. Withers, and T. Withers. |
| 3231. J. Wheatley. | 688. W. Smith. |
| 3236. A. P. Charles. | 738. J. Saunders and J. Piper. |
| 3260. T. G. Webb. | 739. S. L. Crocker. |
| 3279. R. E. Donovan. | 852. G. A. Cox. |

[From Gazette, June 2nd, 1863.]

June 2nd.

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| 3232. T. Cook. | 3296. V. Mirland. |
| 3243. C. F. Claus. | 3200. G. Jeffries. |
| 3252. J. Braddock. | 3303. P. Effertz. |
| 3256. J. Robinson. | 3304. W. E. Newton. |
| 3258. R. Wallis. | 3316. J. King. |
| 3262. L. Christoph, W. Hawksworth, & G. P. Harding. | 3320. J. R. Breckon and T. Douglas. |
| 3263. E. B. Wilson. | 3323. A. W. Burgess. |
| 3267. W. J. Smith. | 3324. J. Imray. |
| 3272. J. Craig and M. Craig. | 3325. W. Goulding. |
| 3273. G. Wright. | 3329. J. E. Roussel. |
| 3274. W. McNaught. | 3334. S. Fox. |
| 3281. W. Palliser. | 3348. G. Buchanan. |
| 3284. J. Sellars. | 3365. R. Hattersley. |
| 3288. C. Sanderson. | 3446. J. H. Johnson. |
| 3290. J. Hilliar. | 3469. W. Billingham and J. Requa. |
| 3291. J. Hilliar. | 196. J. Grant. |
| 3292. E. T. Hughes. | 880. J. Howard, E. T. Bousfield, and J. Pinney. |
| 3295. T. Wingate, jun. | |

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[From Gazette, June 2nd, 1863.]

May 18th.

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| 1228. H. N. Nissen. | 1291. F. W. Prince. |
| 1290. J. Paddon and W. Lowther. | 1426. F. G. Calvert, C. Lowe, and S. Clift. |
| 1299. G. Wallis. | <i>May 27th.</i> |
| 1348. C. Clay. | 1306. G. Dowler & G. J. Farmer. |
| 1393. J. Saunders and J. Piper. | 1313. J. H. Johnson. |
| <i>May 19th.</i> | 1314. W. Tasker. |
| 1247. J. Craig. | 1316. Rev. H. Moule and J. Bannehr. |
| 1253. G. Moulton. | <i>May 28th.</i> |
| <i>May 20th.</i> | 1328. A. J. Paterson. |
| 1255. J. Green. | 1347. W. H. Harfield. |
| <i>May 21st.</i> | <i>May 29th.</i> |
| 1264. J. Paton. | 1308. S. Chatwood. |
| 1288. W. Baker. | <i>May 30th.</i> |
| 1289. W. E. Newton. | 1336. W. E. Newton. |
| 1307. J. Dale and H. Caro. | 1573. J. Whitehouse. |
| <i>May 22nd.</i> | <i>May 31st.</i> |
| 1272. M. Cavanagh. | 1337. W. R. Bowditch. |
| 1295. J. Macintosh. | 1343. J. A. Manning. |
| 1303. G. Elliot. | 1356. W. Stratford. |
| <i>May 23rd.</i> | |
| 1286. T. Johnson. | |

PATENTS ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[From Gazette, June 2nd, 1863.]

May 18th.

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| 1226. R. Bell. | 1252. A. R. le Mire de Nor-mandy. |
| 1255. C. Cowper. | <i>May 27th.</i> |
| <i>May 19th.</i> | 1270. L. D. Owen. |
| 1206. A. Allan and T. Hunt. | <i>May 28th.</i> |
| 1254. W. Hulse. | 1288. W. Needham and J. Kite. |
| <i>May 21st.</i> | <i>May 29th.</i> |
| 1291. R. Jobson. | 1297. H. Cartwright. |
| 1292. H. Bessemer. | <i>May 30th.</i> |
| <i>May 23rd.</i> | 1315. E. Heywood and T. O. Dixon. |
| 1250. B. N. de Buffon. | |